Chapter 5: Environmental Consequences

This chapter discusses the potential impacts of the Proposed Action and No Action alternatives on the physical, biological and socio-economic environment. As required by NEPA and WEPA, the impacts discussed here were derived from an analysis of the alternatives as described in Chapter III and the "affected environment" as discussed in Chapter IV (and Part A of Chapter II to a lesser extent). Statements regarding impacts reflect the analysis and best professional judgement of DNR and USFWS scientists and managers. Given the statewide scale of the Proposed Action alternative, the enormous acreage included in the affected environment, the diverse array of management activities being considered and the adaptive management approach being used, it is not possible to fully quantify all potential impacts in a very detailed, site-specific manner. Therefore, analyses were conducted at a broader scale and statements regarding potential impacts are often general in nature.

A. Effects of the Proposed Action Alternative

1. Effects on the Physical Environment

Geology and Soils

Activities included in the Proposed Action alternative will not significantly impact geological features in the area of the affected environment. None of the proposed broad conservation strategies or land management activities involve extensive large-scale manipulations of geological features.

There is a potential for some of the proposed land management activities to affect soils in the area of the affected environment, particularly if best management practices are not followed. Forest, barrens and recreational management activities can adversely affect long-term soil productivity through erosion (surface erosion and mass wasting), displacement and compaction and alteration of chemical composition and of soil ecological communities. Other land management activities carried out under the Proposed Action alternative could potentially augment soil productivity through the enhancement of soil nutrients or maintenance of forest plant cover.

The extent to which long-term productivity is affected by management practices is unknown, but it is generally recognized that poor management has the potential to reduce natural soil

productivity (Pritchett and Fisher 1987). Adverse impacts to long-term soil productivity are directly related to the frequency and intensity of management activities. Sites with the least management-induced disturbance have the highest likelihood of maintaining long-term soil productivity. On sites where forest, barrens and recreational management activities are carried out, potential adverse effects to soils can be minimized through the application of voluntary best management practices, such as those outlined in *Wisconsin's Forestry Best Management Practices for Water Quality* (DNR 1995). Adherence to best management practices should prevent an unacceptable degradation of soils within the affected environment.

Transportation management, particularly the expansion of existing facilities and the construction of new facilities, could affect soil productivity through erosion, displacement and compaction and alteration of chemical composition and soil communities. These effects would be restricted to the highway corridors and immediately adjacent areas. Soil productivity would be eliminated in areas where pavement covers the soil. These unavoidable impacts of transportation management would occur whether or not an ITP is issued.

Similar effects could result from some recreational facility developments. These would likely occur on public lands and would be subject to WEPA review. Any potential impacts of this type would exist whether or not an ITP is issued. Current design standards and construction best management practices can minimize or at least limit these impacts to the affected site.

Topography and Drainage

Activities included in the Proposed Action alternative will not significantly impact topological and drainage features in the area of the affected environment. None of the included broad conservation strategies or land management activities involve extensive or landscape-level manipulation of topological features.

Highway construction will likely alter local topographic and drainage patterns. These impacts will be addressed on a project-by-project basis through the environmental and public review process implemented through the cooperative agreement between the DNR and the DOT. Any potential impacts of this type would exist whether or not an ITP is issued.

There is a possibility of flowage construction for recreational purposes on some county forest lands, however, such development is not currently planned. Such development could alter local drainage and have impacts downstream of the retaining structure (dam). Any such development would be subject to permitting and public review under Chapter 30, *Wis. Stats.*, and would require a finding in the public interest. Such activity is also likely to require a section 404 Clean Water Act permit from the U.S. Army Corps of Engineers. Any potential impacts from this type of activity would exist whether or not an ITP is issued.

Water Quality

Activities included in the Proposed Action alternative would not significantly impact water quality in the area of the affected environment. The broad conservation strategies and the individual land management activities can all be conducted using best management practices to prevent water quality degradation. Other activities occurring in the affected environment (e.g., some agricultural practices, urban development, etc.) are far more likely to impact water quality.

Some forestry practices could have adverse water quality impacts. These impacts can be significantly minimized or eliminated with the application of best management practices, such as those outlined in *Wisconsin's Forestry Best Management Practices for Water Quality* (DNR 1995). Forest lands included in the HCP are largely in public ownership or are managed under one of the forest tax law programs. In either case, best management practices are generally a required part of management (i.e. HCP partners are using best management practices). Any potential impacts of this type would exist whether or not an ITP is issued.

Highway construction will likely alter local drainage patterns, and erosion is a risk at the time of construction; in some cases, wetland impacts may result as well. These types of impacts are unavoidable and would exist whether the ITP is issued or not. These impacts will be addressed and minimized on a project-by-project basis through the environmental review process outlined in the cooperative agreement between the DNR and the DOT. Some roadway projects may also be reviewed and water quality impacts minimized through the U.S. Army Corps of Engineers' section 404 Clean Water Act permitting program. The USFWS may provide water quality recommendations through the NEPA review process for larger highway projects. Any impacts associated with highway activities would be largely restricted to the site and not have significant impacts on the affected environment.

Some recreational developments may alter site-specific topographic features or local drainage patterns. These impacts would likely be considered at the time of project development, especially if they are occurring on public lands subject to the WEPA process. Current design standards and construction best management practices can minimize or at least limit these impacts to the site.

Climate and Weather

Activities included in the Proposed Action alternative will not significantly impact climate or weather conditions in the area of the affected environment. None of the proposed broad conservation strategies or land management activities involve actions that would significantly alter local or regional conditions. Any climate or weather impacts associated with the Proposed Action alternative would exist whether or not an ITP was issued.

Air Quality

Activities included in the Proposed Action alternative would not likely have significant impacts on air quality in the area of the affected environment. None of the proposed broad conservation strategies or land management activities involve actions that would significantly alter regional conditions. Any local air quality impacts associated with the Proposed Action alternative would exist whether or not an ITP was issued.

Some forestry, right-of-way maintenance and barrens management practices could have short-term, local effects on air quality. For example, prescribed burning can contribute to particulate matter and other pollutants. Local air quality could be degraded by development of transportation or recreation developments included in the Proposed Action alternative, particularly during the construction process. The U.S. Clean Air Act (42 U.S.C. s. 7401 *et seq.*) is designed to reduce air pollution, protect human health and preserve the nation's air resources. To regulate air quality, the Clean Air Act sets a number of standards (referred to as National Ambient Air Quality Standards). Wisconsin's implementation of the Clean Air Act is guided by existing laws and regulations. Particulates and other contaminants from prescribed burning and other management activities would be addressed through these existing programs.

One of the ecological benefits of forest lands is the enhancement of air quality. Plants enhance air quality through the process of photosynthesis, in which carbon dioxide is consumed and oxygen is produced. In addition, through photosynthesis, trees serve as reservoirs for the long-term terrestrial storage of carbon dioxide, the gas most closely associated with global warming. Trees also retard the spread of wind-carried particulates by either trapping the material in their leaves or slowing wind speed to the point that particulates cannot remain suspended. Harvesting timber temporarily removes these air quality benefits provided by forests. These benefits would be lost whether or not an ITP were issued.

2. Effects on the Biological Environment

a) Plant Communities

Wisconsin plant communities are described in the report *Wisconsin's Biodiversity as a Management Issue* and are summarized in Part A of Chapter II and Chapter IV. Wisconsin has extensive forest cover roughly equal to that in place at Euro-American settlement (however, the forest today differs considerably in age structure and species composition). Barrens, savannas and prairies exist only in small acreages in scattered locations. Management activities included in the Proposed Action alternative will occur primarily on lands that support these communities (forest, barrens, prairies and savannas). While 264,916 acres represents a significant amount of land, this is a small percentage (< 1 percent) of the total 35 million acres of land in Wisconsin. Given the

number and distribution of acres involved in the Proposed Action alternative, it is unlikely that the Proposed Action alternative will have significant effects on native plant communities on a statewide basis. Yet, the Proposed Action alternative represents one of the more significant efforts during the post-agricultural time period to change vegetation in central Wisconsin.

Under the Proposed Action alternative, several county forests, the Nature Conservancy, some utilities, the DOT and the DNR plan to modify their barrens, prairie and savanna management activities in order to manage with consideration for Karner blue butterflies. These modified management practices will be used to apply long-term habitat, shifting mosaic and/or dispersal corridors conservation strategies on partner lands (see Tables 2.14 and 2.15, pages 93-96). A large number of acres on public lands will be proactively managed for barrens, prairie and savanna management after languishing for more than 50 years. The use of barrens, prairie and savanna management, particularly for long-term habitat maintenance, could increase the overall number of acres of these community types. While such efforts may help regain lost biological diversity and be viewed as positive impacts, the actual number of acres involved relative to the total number of acres of barrens, prairies and savannas in the state is small.

Forest industry partners, some utility companies, several county forests and the DNR will use forest management as a means of managing for long-term habitat, shifting mosaic and dispersal corridors. These partners will modify forest management practices as described in their conservation agreements to consider the Karner blue butterfly and its habitat (for additional information on planned modifications, see the individual conservation agreements, Part C of Chapter II and Appendix F). The application of forest management practices on the landscape will result in a decrease in the number of acres of mature forest as timber harvest occurs. Forest regeneration will result in the restoration of many of these acres over time. Given the total number of acres of forest land in Wisconsin, losses associated with the Proposed Action alternative can be expected to have no significant impact. Again, the actual number of acres involved relative to the total number of acres of forest in the state is small.

While timber harvesting has the potential to create substantial acreages of early-successional communities throughout the Karner blue butterfly's high potential range, it is also important to recognize that ecosystem integrity is at risk when disturbance occurs too often or with too great a severity for recovery prior to the next disturbance (Everett and Baumgartner 1997). As such, forest regeneration is a necessary part of maintaining ecosystem integrity and preserving overall biological diversity. The variety of silvicultural practices used by the HCP partners for harvest and regeneration will likely ensure a diverse array of seral stages. Maintenance of disturbance regimes and an array of stand structures across the landscape to conserve biological diversity is also a process of maintaining a diverse portfolio of economic opportunities (Everett and Baumgartner 1997).

b) Karner Blue Butterfly Populations

Issuance of an ITP and implementation of the HCP would likely have a significant positive effects on the conservation of the Karner blue butterfly in Wisconsin. The broad conservation strategies and modifications to land management activities were developed with the biology of the Karner blue butterfly specifically in mind.

Potential impacts to Karner blue butterflies from four different aspects of the Proposed Action alternative have been assessed. These include:

- risks from the application of the broad levels of conservation focus,
- risks from land management activities,
- risks from the non-partner participation strategy, and
- cumulative effects of multiple Karner blue butterfly management activities.

The results of each of these analyses are discussed below.

c) Assessment of Risk from Application of Broad Levels of Conservation Focus

As discussed in Chapter III, the most effective approach to terrestrial invertebrate conservation is that based on conservation of habitat (New 1984, Coy 1995, and reference cited therein). Disturbance is an integral part of ecosystem process (Sprugel 1991, Rogers 1996); the restoration of ecological processes, including disturbance, is an important tenet of conservation biology (Pickett and White 1985, White 1987, Rogers 1996). Key (1978) points out that even small areas of indigenous flora subject to periodic disturbance can be a valuable refuge for insects that have been completely eliminated from adjacent sites. On-going disturbance maintains an early successional community. The Karner blue butterfly and its host plant wild lupine are typically found in these types of communities. As such, an important premise of the Proposed Action alternative is that the maintenance of suitable habitat relies heavily on ecological disturbance. The maintenance of habitat through disturbance is the basis for each of the conservation strategies analyzed in this impact assessment.

Geographic information system (GIS) analyses have been shown to be useful in impact assessment work (Eedy 1995). A GIS analysis was conducted to compare the known locations of Karner blue butterfly element occurrences with the locations of lands to be managed as part of the Proposed Action alternative. Lands being managed under each of the broad levels of conservation focus (i.e. those lands managed with consideration for or to protect and enhance Karner blue butterflies) bear a relationship to documented Karner blue butterfly occurrences. Figure 5.1 (pages 282-285) depicts the locations of partner lands included in the HCP, as well as the locations of Karner blue butterfly element occurrences. One hundred ninety-seven of the 281 Karner blue butterfly element occurrences (70 percent) are located on partner lands included in

the management with consideration category. One hundred twenty-six of these occurrences (64 percent) are located on public lands and 71 (36 percent) are on private lands. An additional 34 element occurrence (12 percent of the total occurrences) are located on lands that will be managed to protect or enhance Karner blue butterfly habitat; thirty-three occur on public lands and one occurs on private land. In other words, *82 percent of Karner blue butterfly element occurrences are located on partner lands proposed for proactive management.*

Of the total 264,916 acres included for management under the Proposed Action alternative, 181,222 are in public ownership. The GIS analysis shows that the majority of Karner blue butterfly element occurrence are located on these lands (57 percent; 159 of 281 element occurrences). Figure 5.2 (pages 286-289) depicts the locations of public lands and Karner blue butterfly element occurrences. Since land management on these public lands is subject to public participation and input, there is an added level of assurance that management strategies will be applied to these lands (i.e. management on these lands will be subject to public scrutiny).

Because of the ephemeral nature of early-successional habitats, their distribution in time and space is important (Thompson and Dessecker 1997). Natural and anthropogenic disturbances and succession change the availability of early-successional habitats. While the GIS analysis was not able to assess the distribution of the various strategies to be applied under each level of conservation focus (or the resulting early-successional habitat acreages), the institutional arrangements included in the HCP allow for partners to coordinate their management activities so the distribution of early-successional habitats is considered over long time periods and large areas. Figure 3.5 (page 206) provides an example of how the shifting mosaic strategy can be applied on the landscape. Such a strategy allows for wildlife requirements to be planned for over larger spatial and temporal scales than would be possible if the partners were not working together. The distribution of regenerating stands is important from a silvicultural standpoint as well (Thompson and Dessecker 1997).

In addition, the entire HCP relies on the application of adaptive management principles. All of the partners have committed to this approach. Karner blue butterfly population and habitat status will be monitored (as outlined in Part D of Chapter II). Any significant declines in Karner blue butterfly populations will trigger action by the partners to ensure the application of the management strategies is resulting in Karner blue butterfly conservation. Monitoring protocols and procedures are built into the legally-binding conservation agreements between the DNR and the individual partners, and will be included in the DNR's Implementing Agreement and the ITP. The HCP partners monitoring activities during the summers of 1997 and 1998 demonstrate, in part, their commitment to the adaptive management process.

Figure 5.1. Location of HCP Partner Lands and Karner Blue Butterfly Element Occurrences

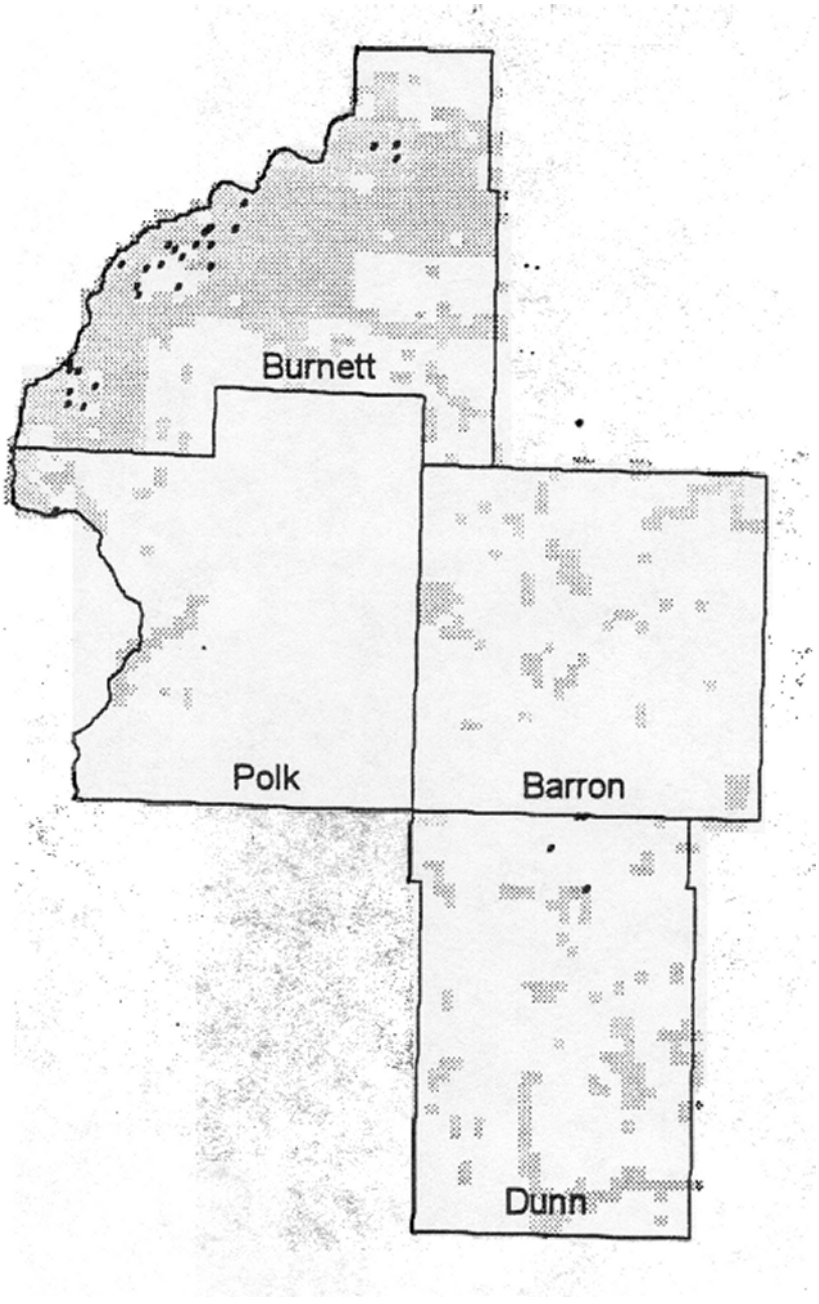
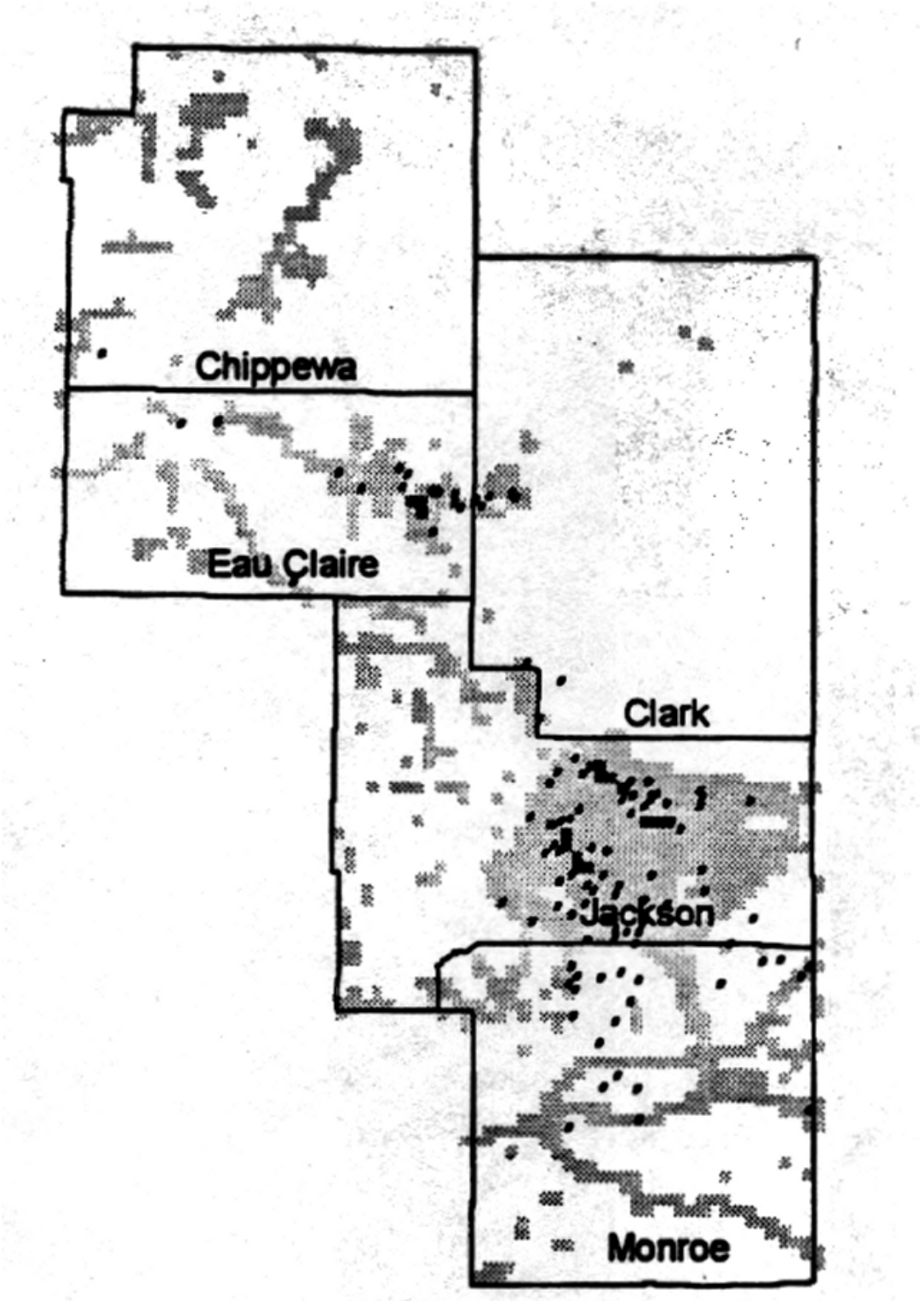
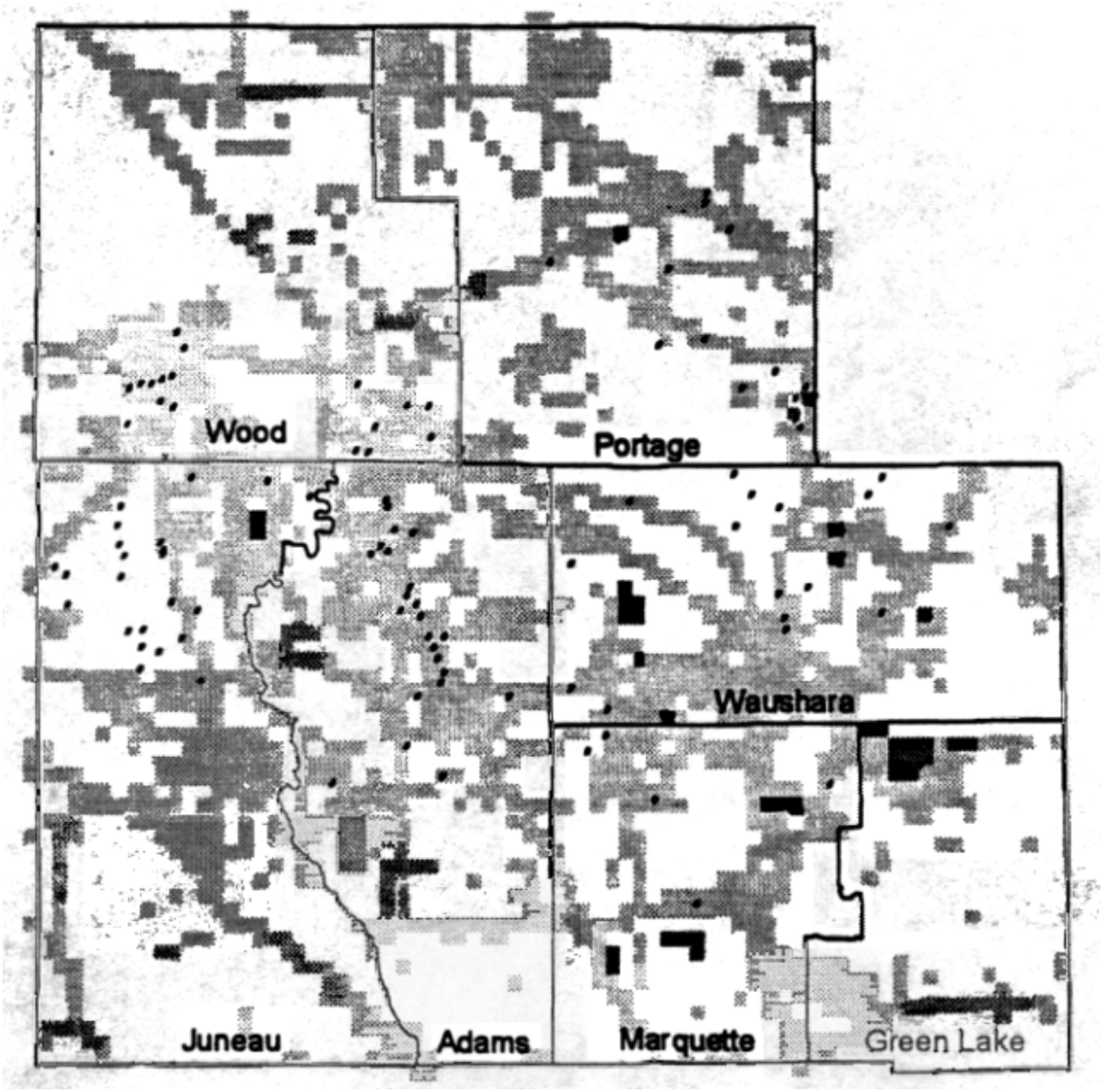


Figure 5.1 continued on next 3 pages


Chippewa
Eau Claire
Clark
Jackson
Monroe


Wood
Portage
Waushara
Juneau
Adams
Marquette
Green Lake

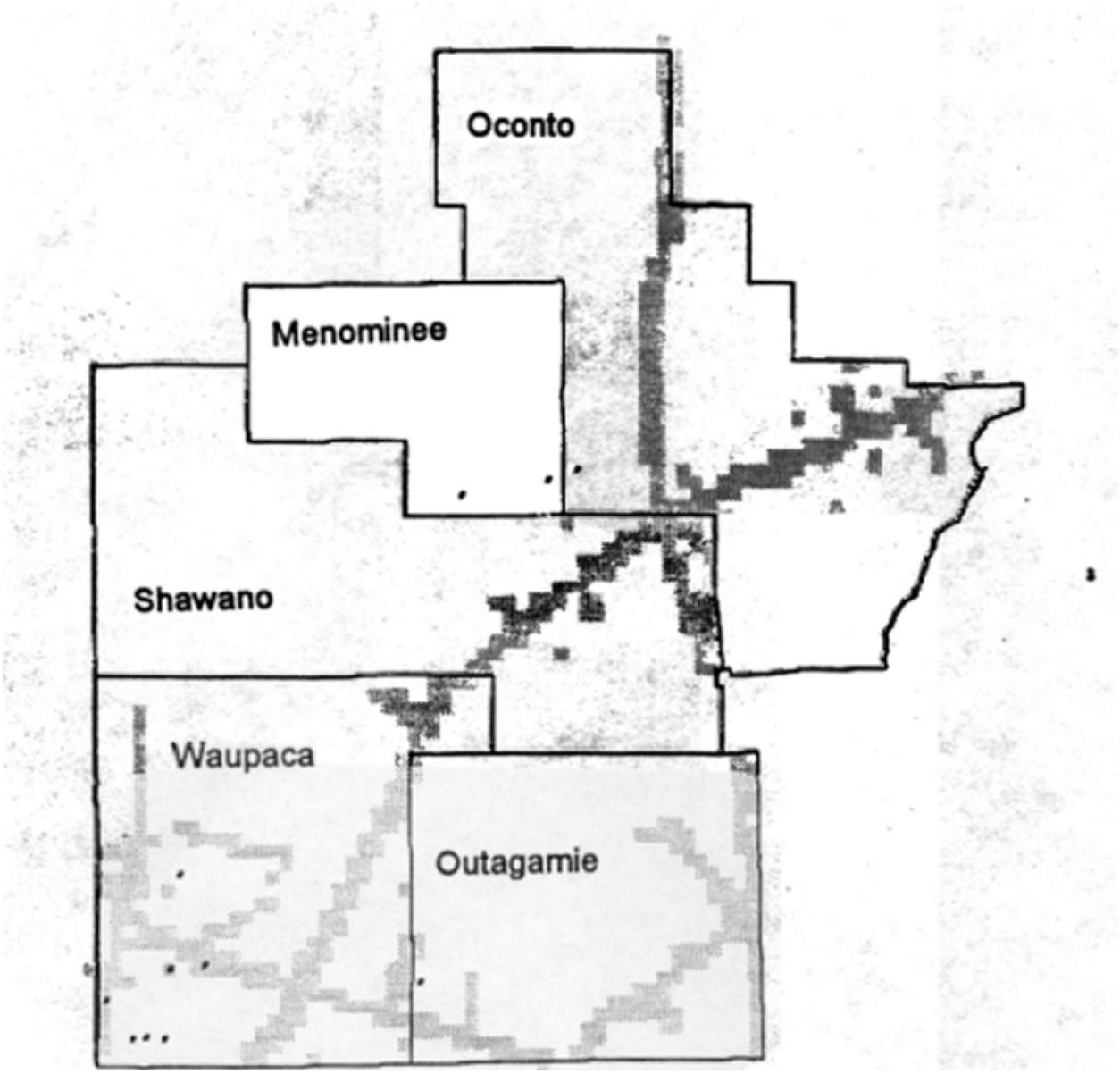

Oconto
Menominee
Shawano
Waupaca
Outagamie

Figure 5.2 Location of Public Lands Included in the HCP and Karner Blue Butterfly Element Occurrences

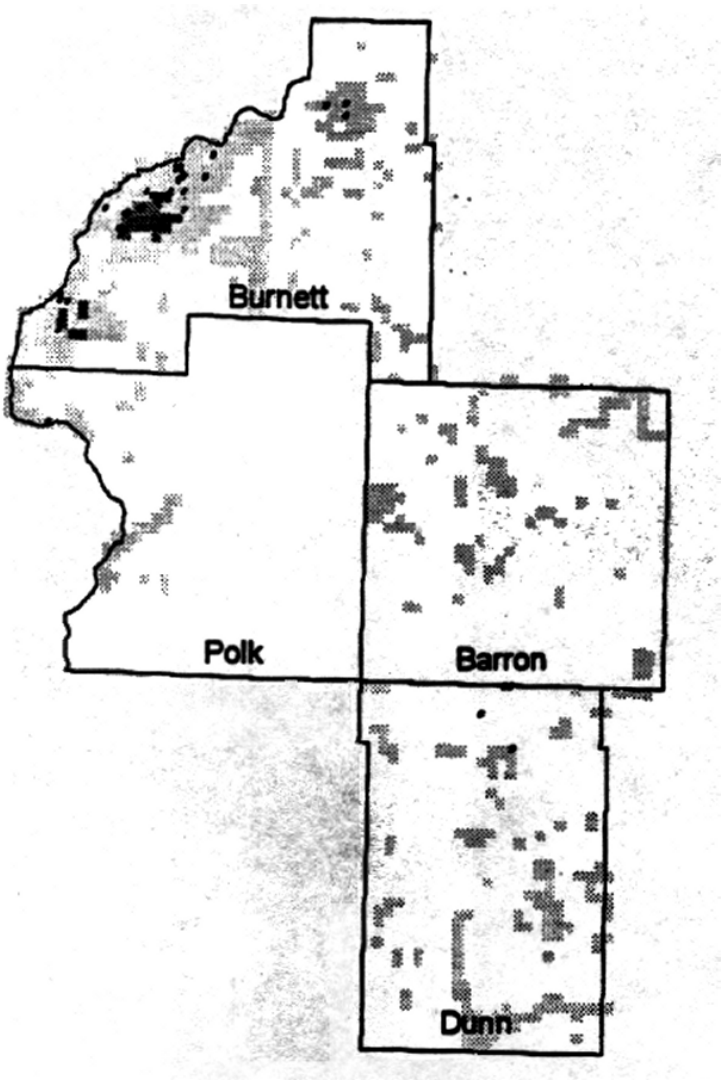
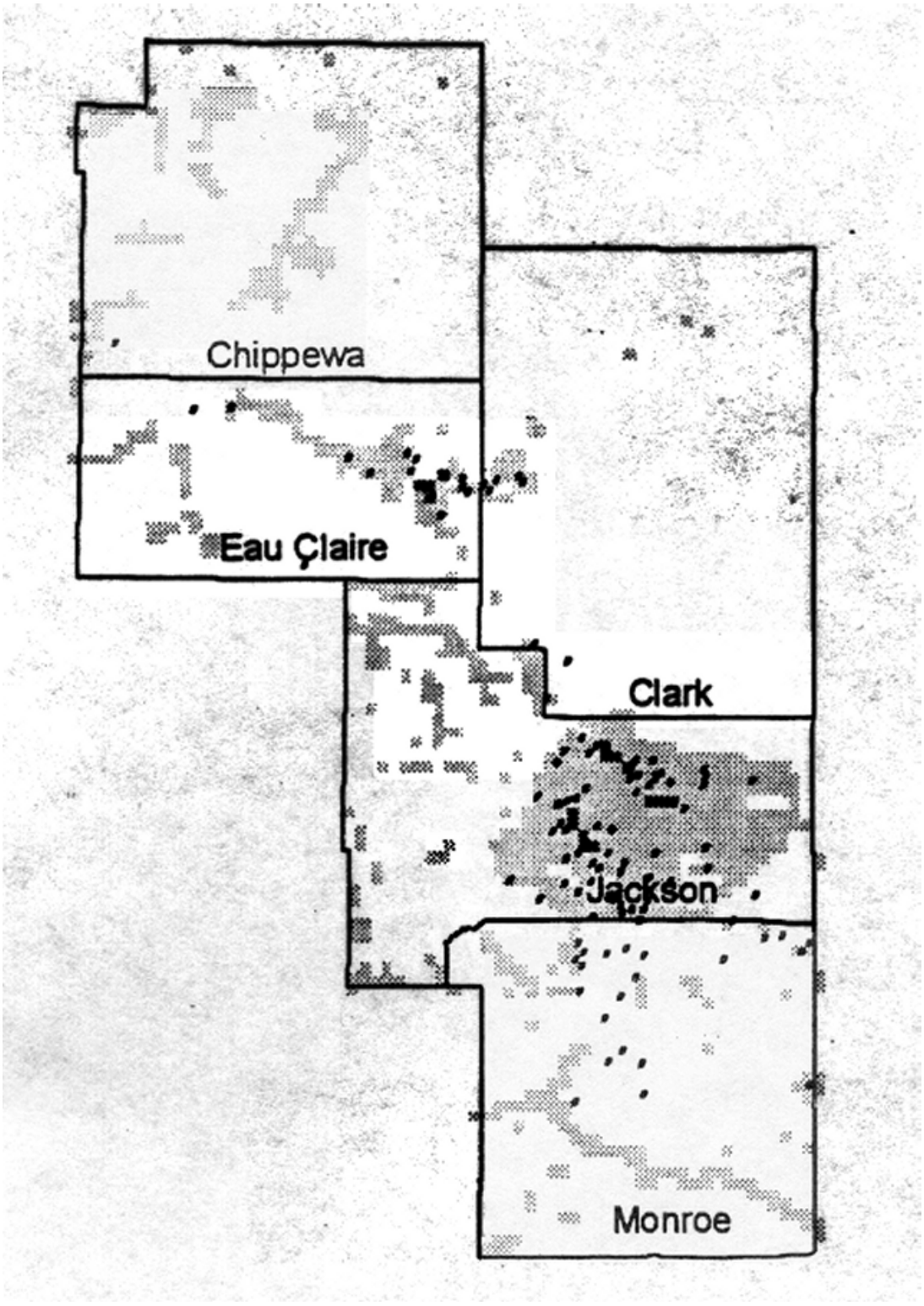
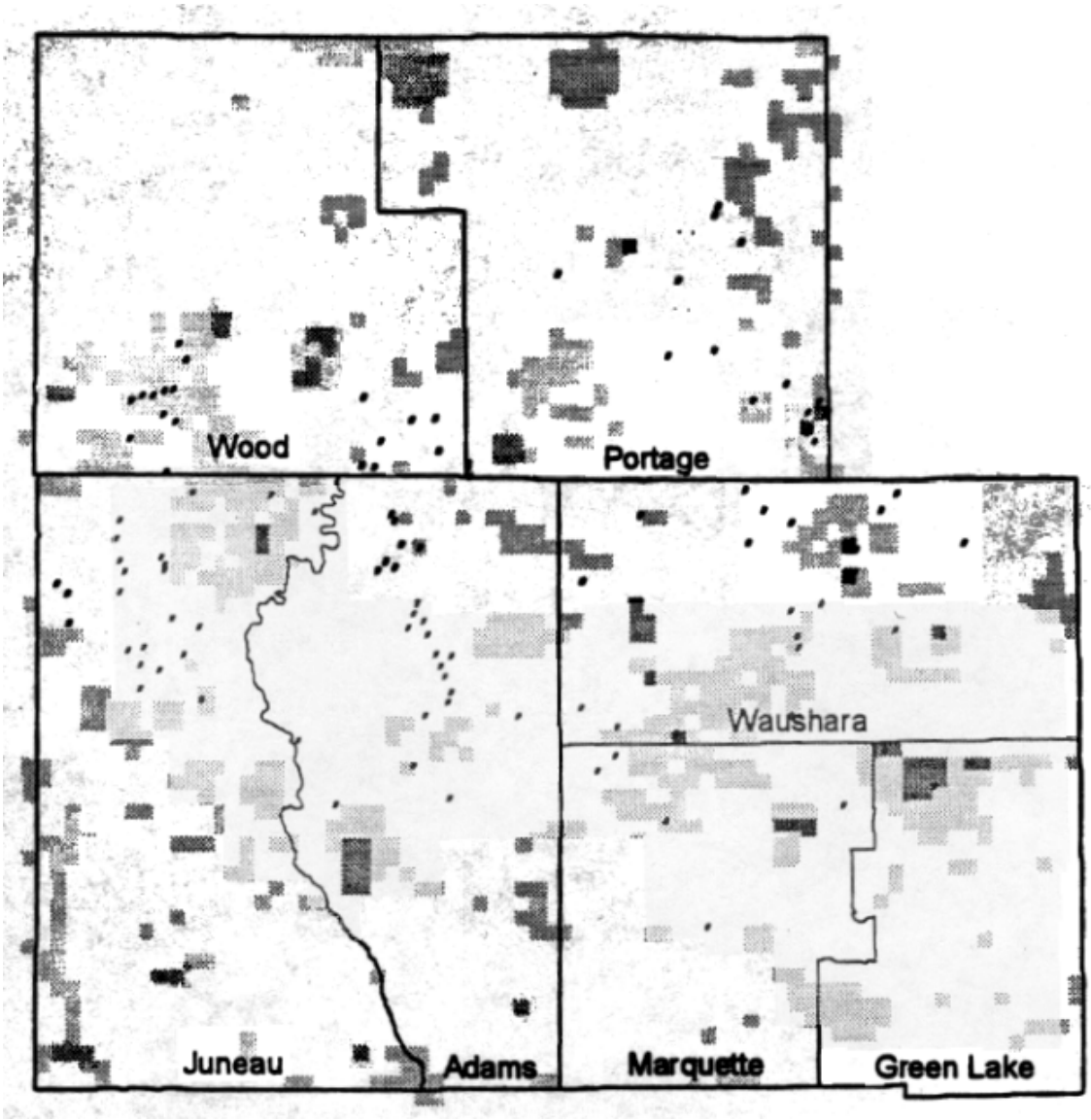
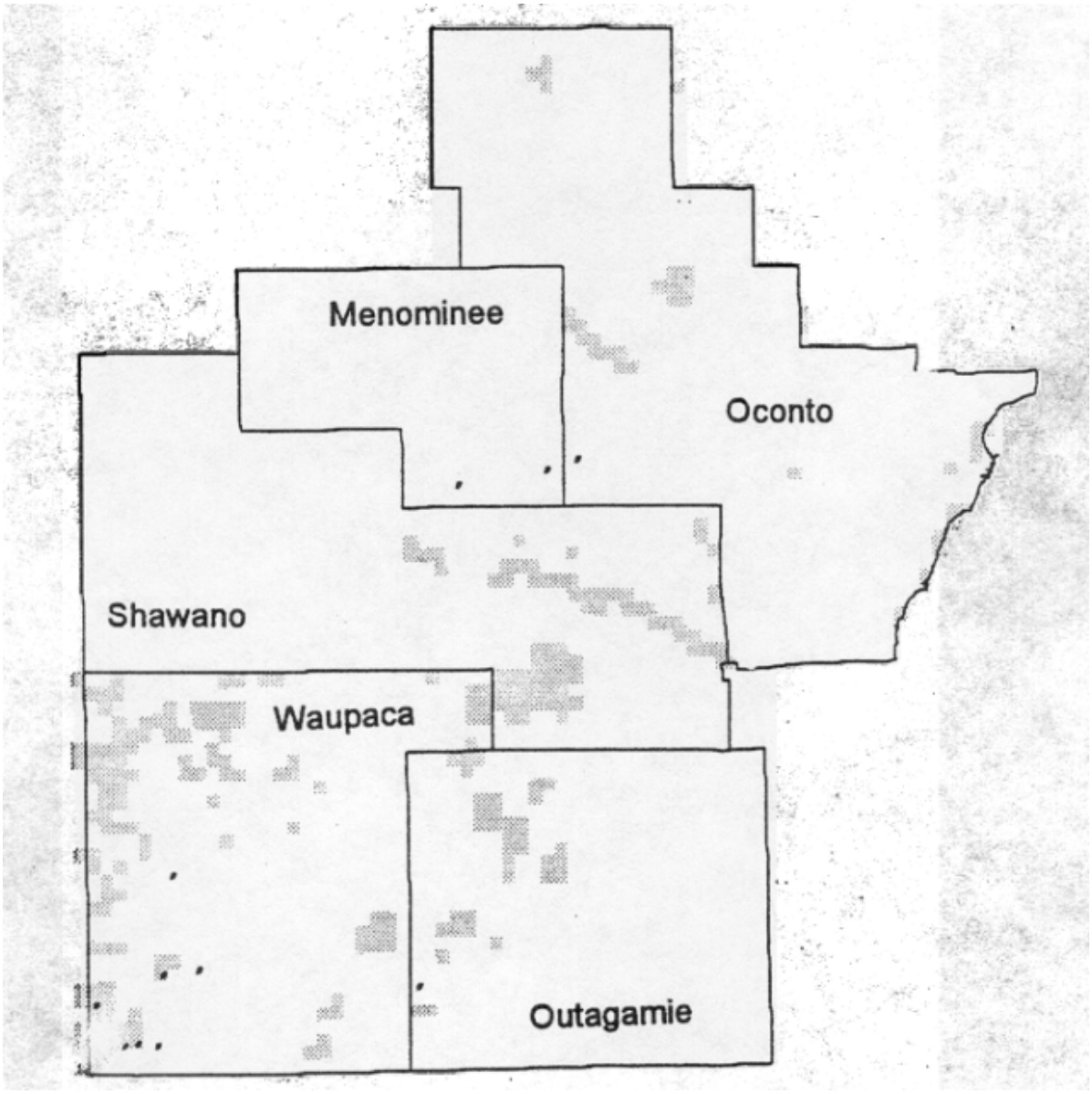


Figure 5.2 continues on next three pages


Chippewa
Eau Claire
Clark
Jackson
Monroe


Wood
Portage
Waushara
Juneau
Adams
Marquette
Green Lake


Menominee
Oconto
Shawano
Waupaca
Outagamie

The partners have also committed to a research program to support their adaptive management efforts (see Part D of Chapter II, pages 114-124). The research topics outlined in the HCP are intended to provide pertinent and relevant information to managers on the ecological requirements of both Karner blue butterflies and lupine habitats. Such information is necessary for conservation (Gaskin 1995) and can complement research done as part of the federal recovery planning efforts.

d) Assessment of Risks to the Karner Blue Butterfly and its Habitat from Land Management Activities

Individual partners have varying long-term management goals and purposes for the lands they own and manage. To achieve these goals, partners engage in a variety of land management activities. These land management activities are described, as part of the Proposed Action alternative, in more detail in Part C of Chapter II, Chapter III and the references cited therein. Table 2.15 (pages 95-96) indicates the primary land management activities identified by partner groups that are typical in normal operations. Table 3.2 (pages 199-200) outlines the relationship between these activities and the broader conservation strategies in the context of the two levels of conservation focus (i.e. management with consideration and management to feature, protect or enhance). A literature review was conducted to assess the potential consequences of each category of land management activities to the Karner blue butterfly and its habitat. This part briefly outlines the findings of that review for four categories of management activity:

- Forest Management,
- Barrens, Prairie and Savanna Management,
- Recreational Management,
- Transportation Management, and
- Utility Rights-of-Way Management.

In short, there appears to be relatively little risk of long-term, adverse effects on the Karner blue butterfly or its habitat from land management activities included in the Proposed Action alternative.

Forest Management

Forest management activities included in the HCP are not expected to have significant, long-term adverse effects on the Karner blue butterfly or its habitat. In areas where Karner blue butterflies occur, timber harvest, stand improvement and forest regeneration activities, as well as the use of forest roads, may have direct, short-term impacts to individual Karner blue butterflies or wild lupine plants. However, the HCP partners have committed to a "no net loss of habitat" approach, and disturbance caused by carefully planned activities will minimize direct effects to the Karner blue butterfly and will likely enhance habitat for wild lupine and nectar plants, and thus benefit

the Karner blue butterfly in the long-term. Lane (1997) provides a thorough review of potential impacts of forestry management practices on the Karner blue butterfly and its habitat. That report, and references cited therein, provides much of the basis for the discussion presented here.

Timber Harvesting. While the impacts of timber harvesting on Karner blue butterflies cannot be easily quantified, it is clear that harvesting activities conducted during the April through August period may have negative direct impacts on larvae, pupae or adult butterflies, as that is the period when these life stages are present. Harvesting activities during the September through March period may result in a reduction of direct impacts to Karner blue butterflies as the butterflies are only in the egg stage at this time. Karner blue butterfly populations benefit indirectly from site disturbance, so summer logging which creates site disturbance, although resulting in some incidental take of individual butterflies, will likely be more beneficial to the overall populations than winter logging. In addition, some biologists believe that, in at least some portions of the documented range, winter logging may result in the encouragement of Pennsylvania sedge (*Carex pensylvanica*) which vigorously competes with wild lupine (Dan Hartman, Consolidated Papers, Inc., pers. comm.). This may be particularly true if clear cutting is the harvest method applied.

Clearcutting is believed to be compatible with Karner blue butterfly management. It is expected that the removal of canopy cover will result in sufficient quantities of light reaching the understory herbaceous vegetation to promote flowering and reproduction. The effect of clearcutting on ground layer vegetation will depend upon the size and shape of the harvest area, intensity of the cut, site index and rotation length (Lane 1997 and references cited therein), as well as weather factors in years following the clearcut (McCaffery, *et al.* 1981). Selective cutting is expected to be compatible with Karner blue butterfly plant resources, if the canopy in areas within the cut is open enough to allow understory herbaceous plants to both flower and vegetatively reproduce, and if a diversity of microhabitats are maintained in areas with host and nectaring plants (Lane 1997). Partners recognized the need for microhabitat diversity when developing their conservation measures. For example, some partners will leave stands of larger diameter hardwoods to provide a mix of shaded sites and adjacent sunny openings.

Wild lupine, nectar plant and Karner blue butterfly colonization of recently cut areas is expected to be more successful the closer source populations are to the disturbed area. For sites where colonization is expected to occur from adjacent areas, smaller harvest areas may increase the rate and probability of colonization (Lane 1997). These factors were considered in the development of individual partners' conservation measures. For example, some partners have committed to smaller than normal harvest blocks in a rotation pattern that provides a shifting mosaic of habitat.

A variety of logging systems (felling and skidding) will be employed in implementing the HCP. These logging systems may have either positive or negative effects on Karner blue butterflies, depending on the condition of the timber stand and on how the management objectives incorporate considerations for wild lupine and the Karner blue butterfly with timber management

practices. For example, soil disturbance is expected to increase as felling method shifts from cut-to-length to tree length to full tree (Zasada 1975, Lane 1997). The intensity of disturbance, however, may be greater for full tree and tree length harvest for the areas where the trees and logs are dragged. (i.e. mechanized operations which use whole-tree or pole skidding will likely result in more site scarification then will shortwood skidders) (Zasada 1975). Soil disturbance increases the likelihood of wild lupine establishing or increasing in abundance (provided it is not out competed by other vegetation).

Stand Improvement. Stand improvement techniques are typically conducted to improve the forest (tree) composition of the stand or to improve the growth and quality characteristics of individual trees within the stand. These techniques generally focus on controlling competing vegetation and controlling pest species populations. Stand improvement activities are not expected to have significant, long-term adverse effects on Karner blue butterflies. In fact, replacement of plants competing with tree crops with Karner blue butterfly plant resources is expected to benefit both the crop trees and the Karner blue butterfly (Lane 1997).

Herbicides and insecticides are important tools for stand improvement and, if used carefully, can incorporate considerations for the Karner blue butterfly. Herbicide research is currently being conducted to determine the impact of various herbicides on Karner blue butterfly habitat. Herbicides being studied are glyphosate, sulfometuron methyl and triclopyr ester (see Part D of Chapter II, pages 114-118). Although the results of this forestry research will not be known for several years, it is generally believed:

- ☞ that herbicides will have a negative impact on established wild lupine when applied to pre-senescent foliage;
- ☞ that systemic herbicides with residual soil activity may have a negative impact on the following year's lupine and nectaring plants;
- ☞ that late-summer or fall (post lupine senescence) applications of foliar active herbicides may reduce vegetation that is competing with lupine, resulting in a positive impact to the Karner blue butterfly (the impacts to nectaring plants may vary from site to site, from year to year, and by type of herbicide and rate applied);
- ☞ that most herbicide applications are conducted during the Karner blue butterfly egg stage and this application will not harm the Karner blue butterfly.

The HCP partners have considered current research on herbicides and developed guidelines for the use of herbicides to minimize any adverse effects to Karner blue butterflies as part of the Proposed Action alternative (see Appendix F).

The timely applications of silvicultural insecticides may not be possible without negatively impacting Karner blue butterflies in some cases. An example is the control of Gypsy moths (*Lymantria dispar*). The gypsy moth is an introduced forest pest commonly controlled with the

bacterium *Bacillus thuringiensis* var. *kurstaki* (BT). BT has been shown to have a negative impact on non-target butterfly and moth species (Carter, *et al.* 1994), and is typically applied at the same time Karner blue butterflies are at susceptible life stages. Research examining the physiological and phenological susceptibility of Karner blue butterfly to BT was recently completed (Herms 1996; Herms, *et al.* 1997). Herms (1996) and Herms, *et al.* (1997) found significantly higher mortality for larvae treated with BT in a laboratory bioassay than for larvae in a control group. Karner blue butterflies are also phenologically susceptible to BT used for gypsy moth control, although the larval generation at risk and extent of phenological overlap may vary from year to year (Herms, *et al.* 1997). Procedures for dealing with gypsy moth infestations in the Karner blue butterfly's range are outlined in Table 2.23 in Part H of Chapter II (page 178) and are intended to minimize to the greatest extent possible any impacts to Karner blue butterflies. It should also be noted that the forest management activities included in the Proposed Action alternative are not inconsistent with the silvicultural guidelines developed for gypsy moth control (Brooks and Hall 1997).

Prescribed Burning. A primary goal of prescribed fire in forest management is to create more open stand structures, thereby improving tree vigor and reducing vulnerability to insects, disease and severe fire (Fiedler 1996). The reduction in abundance or cover of plants competing with Karner blue butterfly plant resources is likely to result in an increased abundance of lupine and nectar plants (Lane 1997). Increases in this species would likely benefit the Karner blue butterfly over the long-term.

Some level of mortality to Karner blue butterfly larvae and adults can be expected at occupied sites where prescribed burning is used. Adult Karner blue butterfly numbers are expected to be lower immediately following fire, however, populations are expected to increase over the long-term (Lane 1997). Karner blue butterflies present in the site are expected to move onto recently burned areas following lupine resprouting, provided adjacent unburned areas allow large enough numbers to survive and re-populate the site.

Additional information on the effects of prescribed fire is presented in the "Barrens, Prairie and Savanna Management" section of this chapter.

Forest Roads and Openings. Forest roads in areas with Karner blue butterflies are generally constructed to allow access for vehicles for harvesting, regeneration and the future tending of the new stand of trees. Because of the sandy soil associated with these sites, roads are generally constructed without ditches or gravel, resulting in roads which are narrow and less frequently maintained than those in wetter areas. Because these sandy roads have good natural water drainage, there is little need to maintain these roads with graders or control vegetation through herbicides or mowing. This minimal road maintenance is expected to result in minimal disturbance to lupine, nectaring plants and Karner blue butterflies that would become established in, and along, these roads. Some of these roads would close in fairly quickly as the trees achieved crown closure (Anderson 1989). The Karner blue butterfly could be affected as the level of shade

increased. However, mechanical disturbance and removal of trees and shrubs along forest roadsides is expected during other silvicultural operations, such as harvesting and site preparation, and will keep some areas open.

In addition, roads through the forested landscape serve as important dispersal corridors for Karner blue butterflies moving between open habitats (Welch 1993; Cathy Bleser, Lepidoptera Coordinator, Bureau of Endangered Resources, Wisconsin DNR, pers. comm.). Several HCP partners have agreed to consider use of, or maintenance of forest trails and openings, for the Karner blue butterfly. The maintenance of these areas is expected to have positive long-term effects on Karner blue butterflies.

Forest Regeneration. The decisions that are made relative to regeneration can potentially result in some of the largest effects to forest structure and composition and, consequently, the Karner blue butterfly. A brief discussion of potential effects from site preparation, artificial and natural regeneration follows.

Site Preparation. The objective of site preparation is to reduce competitive vegetation, expose mineral soil and remove logging residues. The impact of site preparation on understory vegetation will be determined primarily by three factors: (1) direct effects on mortality, (2) soil disturbance and (3) canopy development. These factors are in turn influenced by the type, severity, extent and season of application (Utzig and Walmsley 1989). Some mortality is expected to occur to Karner blue butterflies present at the time of treatment (Lane 1997). The first few years following site preparation, early successional species are usually favored (Swindel, *et al.* 1983). However, disturbance speeds the rate of succession as the overstory is favored and tree growth results in canopy closure.

The extent and severity of soil disturbance during site preparation varies widely with the type of equipment used. Generally, the amount of disturbance can be correlated to the amount of bare mineral soil exposed with scarification. Roller chopping with a single drum, complete land clearing, shearing and patch scarification result in a low extent of exposed surface scarification. A moderate extent of soil scarification could be expected when furrowing with a seed bomb, power disc trenching, roller chopping with a tandem drum, bulldozing the entire site with a root rake and pre-sale dozing (or pre-cut blading). Methods that would result in a high extent of disturbance include brush disking and bulldozing to remove brush and roots with a straight blade. Site preparation is typically conducted when the ground is dry not frozen. Lane (1997) provides an excellent summary of site preparation effects on lupine, nectaring plants, grasses and competing vegetation. In general, she concluded that Karner blue butterfly habitat quality and quantity are expected to increase if site preparation methods can be applied at levels that encourage Karner blue butterfly plant resources (wild lupine and nectaring plants) while controlling competing species. The time that habitat is available for the Karner blue butterfly is expected to increase as stand density is managed to prolong the

time to canopy closure (Lane 1997).

The HCP partners have considered the above factors when developing their individual conservation measures. Management with consideration of the Karner blue butterfly includes modifications to site preparation activities to minimize negative effects to the Karner blue butterfly and its habitat.

Artificial Regeneration. Two common species, jack pine and red pine are typically planted as seedlings to provide the most reliable means of regeneration and the best control over stand density and spacing. Regeneration choices which influence stand density are expected to effect Karner blue butterfly plant resources (i.e. wild lupine and nectaring plants) by influencing the time to canopy closure for crop trees, and the density of crop trees during the rotation (Lane 1997). With consideration for Karner blue butterflies, more soil disturbance will generally occur during machine planting than when hand planting, which may be beneficial to encouraging lupine and nectaring plants.

In addition, with artificial regeneration, the arrangement of planted trees can be manipulated to enhance understory vegetation. This can be accomplished by planting for wider spacing between trees at the time of initial plantings. For example, Benzie (1977a) suggests a wide spacing for red pine of ten by ten feet where understory vegetation is a management objective, and pre-commercial thinnings are not planned or feasible. Such spacing would potentially allow lupine and nectaring plants to establish in the understory. Seeding in comparison, either by aerial or ground application will not give as much control over density of new seedlings as compared with planted stock and could preclude lupine and some nectaring plant in areas of denser canopy cover.

Natural Regeneration. As with seeding in artificial regeneration, natural seeding will not control the spacing and density of the new stand compared to planting a new stand with seedlings. Natural seeding may result in quick crown closure and competition for lupine and nectaring plants (Lane 1997). However, thinning is typically used as a stand improvement technique in sites where natural regeneration is used (D. Zastrow, Bureau of Forestry, pers. comm.), and this could allow for lupine and nectar plants to retain a presence in the stand.

The HCP partners have considered the above factors when developing their individual conservation measures. Management with consideration of the Karner blue butterfly includes modifications to regeneration activities to minimize negative effects to the Karner blue butterfly and its habitat.

While timber harvesting has the potential to create substantial acreages of early-successional communities throughout the Karner blue butterfly's high potential range, it is also important to recognize that ecosystem integrity is at risk when disturbance occurs too often or with too great a severity for recovery prior to the next disturbance (Everett and Baumgartner 1997). Forest

regeneration is a necessary part of maintaining ecosystem integrity and overall biological diversity. The variety of silvicultural practices used by the HCP partners for harvest and regeneration will likely ensure a diverse array of seral stages across the landscape.

Barrens, Prairie and Savanna Management

Barrens, prairies and savanna management activities included in the Proposed Action alternative are not expected to have significant, long-term adverse effects on the Karner blue butterfly or its habitat. In areas where Karner blue butterflies occur, prescribed burning, mechanical management, herbicide treatment and grazing may have direct, short-term impacts to individual Karner blue butterflies or wild lupine plants. However, the HCP partners have committed to a "no net loss of habitat" approach, and disturbance caused by carefully planned management activities will minimize direct effects to the Karner blue butterfly and are anticipated to enhance habitat for wild lupine and thus benefit the Karner blue butterfly in the long-term. The Karner Blue Technical Team (1998) provides a review of potential impacts of some barrens, prairie and savanna management practices on the Karner blue butterfly and its habitat. That report provides part of the basis for the discussion presented here. In addition, HCP partners have committed to following guidelines contained in their conservation agreements and/or the HCP as part of the Proposed Action alternative. These guidelines were developed to minimize harm to the Karner blue butterfly.

Prescribed Fire. Prescribed fire is currently the most widely used tool for barrens management. Fire will have varying effects, depending on factors such as the nature of the vegetation, the timing and intensity of the burn, the weather, etc. Potential benefits of fire include increased seed germination and establishment of lupine and other legumes, increased flowering of nectaring plants and control of Eurasian grasses. Fire is known to have negative effects as well, however. Most significant is mortality to resident animals, especially many invertebrates (including the Karner blue butterfly in all its life stages). Fire may not reduce woody growth, and in fact may encourage greater brushiness through resprouting of aggressive shrubs. Another possibility is that increased productivity of native warm-season grasses, resulting from cool-season fires, could eventually out-compete flowering plants (Karner Blue Tech. Team 1998).

The main benefits of prescribed fire are believed to stem from its role in reducing accumulated plant litter, exposing bare soil, promoting increased soil temperatures and setting back growth of plants that compete with native vegetation. Some of these effects may be achieved or enhanced with alternative management tools either alone, in combination with, or alternatively to fire (Swengel 1996a, Karner Blue Tech. Team 1998). The long-term effectiveness of using solely prescribed fire to maintain barrens habitat is unknown (Panzer 1988, Howe 1994, A. Swengel 1996a, S. Swengel 1996). Caution and appropriate use of fire are needed when managing for the Karner blue butterfly and many other native species (Panzer 1988). The HCP partners considered the above factors when developing their conservation measures and through the application of

adaptive management will minimize negative effects to the Karner blue butterfly and its habitat.

Mechanical Treatment. Mechanical treatment for barrens, prairie and savanna management is not expected to have significant, long-term, adverse effects on the Karner blue butterfly or its habitat. The HCP partners developed conservation measures to ensure that such management activities could be conducted in a "management with consideration" mode. These activities will follow the guidelines in partners' conservation agreements, Part C of Chapter II or the "Wildlife Management Guidelines" included in Appendix F. These guidelines are designed to minimize harm to the Karner blue butterfly.

Many populations of Karner blue butterfly and other barrens-associated species are found on areas maintained solely by mowing and brushing (Swengel and Swengel 1996). Optimal timing for mowing will vary according to habitat needs. To promote Karner blue butterflies, lupine and nectaring plants, mowing generally would occur only in late summer or fall after all second-flight females have laid their eggs and nectar plants have set seed. With late-season mowing, one would expect a much lower level of mortality to Karner blue butterflies than is expected with fire, at least for the short-term. The long-term effectiveness of using solely mechanical management to maintain barrens habitat is unknown. However, some long-term butterfly monitoring conducted throughout the Midwest shows a much higher relative abundance and diversity of grassland-specialist butterflies on areas that are hayed, mowed or lightly grazed, or left untreated than on areas that are regularly burned (Swengel 1996, 1998; Swengel and Swengel 1997).

Herbicide Treatment. Significant adverse effects to Karner blue butterflies and wild lupine habitat are not expected from the use of herbicides. If used properly, spot-herbicide applications can have minimal impact to the Karner blue butterfly and its habitat, and, in most cases, herbicide applications are not expected to cause direct mortality to the Karner blue butterfly (Lane 1997). Partners have committed to following the herbicide use guidelines included in their individual conservation agreements or Appendix F as a means of minimizing adverse effects to the Karner blue butterfly..

In addition, several HCP partners have sponsored research, now underway through the University of Minnesota, on the effects of three common forestry herbicides on the Karner blue butterfly and its habitat. Preliminary results from this research are summarized on pages 114-118 in Part F of Chapter II. Also, see the discussion of herbicide impacts under the "Forest Management" section of this chapter.

Native Plant Propagation. Introduction of native plant species often is a part of barrens and prairie restoration and enhancement (Henderson 1995b), and such propagation as part of the Proposed Action alternative is expected to have positive long-term effects on Karner blue butterfly habitat. For example, it is possible that sites targeted to support the Karner blue butterfly under a barrens management (or some other) strategy may not provide sufficient wild lupine to sustain significant butterfly populations. Wild lupine, however, can easily be seeded in and can enhance the potential for the sites to maintain Karner blue butterflies. In other cases, occupied areas may require enhancement with additional nectaring plants or tall prairie grasses to favor the Karner blue butterfly (and other invertebrate species that may depend on certain plants). It is expected that at least some HCP partners conducting barrens, prairie and savanna management activities will use native plant propagation as part of the restoration activities outlined in their individual conservation agreements.

Grazing. No significant, long-term adverse effects are expected from grazing. Grazing can cause shifts to lower seral stages, which may benefit savanna species (Payne and Bryant 1994), including wild lupine. Historically, herds of native bison and elk undoubtedly played an integral role in maintaining prairies and savannas, along with burrowing animals and native insects and diseases that damage or destroy trees. Some researchers believe domestic grazers such as sheep, goats or even cattle might be used, if they are rotated across a site and graze a given area only for occasional, brief periods (i.e. simulating natural grazing by roaming herds) (see Payne and Bryant 1994). However, the long-term effectiveness of using solely grazing to maintain barrens habitat is unknown. At DNR's Sandhill State Wildlife Area, an opportunity exists to study how its bison herd impacts barrens communities. Any findings from studies at the Sandhill Wildlife Area will be shared with HCP partners.

Recreational Management

Several of the HCP partners manage lands used by the public for recreation. However, no significant, long-term adverse effects to the Karner blue butterfly or its habitat are expected as a result of implementing recreational management activities outlined in the Proposed Action alternative. The Karner blue butterfly-related impacts of recreational management will vary from locally severe impacts, such as paving a parking lot (although, no such activities are anticipated under the Proposed Action alternative), to beneficial impacts, such as maintenance of forest trails used by the butterfly for nectaring and dispersal. Potential impacts are discussed below.

Intensive Development and Maintenance. Intensive construction/facility developments could destroy habitat for the Karner blue butterfly. These types of activities are not currently anticipated to be a part of the Proposed Action alternative. However, if development of such a facility will result in permanent take, partners engaged in the activity have agreed to first try to avoid the site. If the site cannot be avoided, the partner will prepare a mitigation plan for DNR and USFWS approval. Any impacts of this nature will likely be very local with respect to the larger available

habitat and can be proactively addressed through the mitigation plan.

Less Intensive Development and Maintenance. Other developments will more moderately affect Karner blue butterfly habitat or even help support the Karner blue butterfly and other species. For example, Karner blue butterfly adults are known to travel along the sunnier, maintained trails cut through forested lands and, in some cases, even lay eggs in these areas. Wider trails that permit more sunlight appear to serve as butterfly dispersal corridors connecting one opening to the next or even providing habitat in their own right (C. Bleser, Lepidoptera Coordinator, Bureau of Endangered Resources, Wisconsin DNR, pers. comm.).

Public Use. All terrain vehicle use, hunting, hiking, berry picking and other human uses of Karner blue butterfly habitat are likely to result in some incidental take of the butterfly through trampling or running over adult butterflies, eggs or larvae. Direct impacts of this type are not expected to be significant relative to the overall butterfly populations. Heavy traffic through occupied habitat will generally be prohibited as part of the Proposed Action alternative.

When the ground is frozen, and/or where there are several inches of snow cover, human foot traffic over occupied areas should have minimal impacts to eggs over wintering in the plant litter. Deer hunting in Karner blue butterfly areas may be important to reducing deer herbivory on lupine flowers -- a serious problem in some areas.

Transportation Management

Transportation management activities included in the HCP are not expected to have significant, long-term adverse effects on the Karner blue butterfly or its habitat. In areas where Karner blue butterflies occur, road development, road maintenance and ROW vegetation control may have direct short-term impacts to individual Karner blue butterflies or wild lupine plants. Currently, the Wisconsin DOT is the only HCP partner involved in transportation projects as part of the Proposed Action alternative. The Wisconsin DOT has committed to minimizing negative impacts through the application of conservation measures specified in its conservation agreement. In addition, the Wisconsin DOT has committed to a "no net loss of habitat" approach, and disturbance caused by carefully planned activities will minimize direct effects to the Karner blue butterfly and will likely enhance habitat along roadside ROWs for wild lupine, indirectly benefitting the Karner blue butterfly in the long-term.

Road Development. The development of new or expanded roads can have both beneficial and detrimental impacts to the Karner blue butterfly habitat in that there is a major change or disturbance to the surface area of the road ROW corridor. A benefit may be realized in ROW areas where native vegetation is restored and managed. Except for the areas where a hard surface is developed, the clearing of a new ROW can actually enhance the potential for wild lupine to grow by creating open areas that allow the plants to spread and colonize new areas.

Detrimental effects would occur where a concrete, blacktop or maintained gravel surface permanently precludes native vegetation from establishing and thereby reduces the overall area available for habitat. Under the Proposed Action alternative, wild lupine and nectar plant source colonies will be identified prior to road construction. If these sites are determined to have a high potential for Karner blue butterfly occurrence, on-site verification will be required to determine presence or absence. When field surveys indicate that a population of Karner blue butterflies occurs within a project area, and if avoidance is not possible, the DOT will consult with the DNR and USFWS for approval of mitigation strategies.

Road Maintenance. Road maintenance activities will not likely have negative, long-term effects on the Karner blue butterfly or its habitat. These activities (snow and ice removal, salting and sanding, road surface repairs, etc.) are largely restricted to the paved surface where Karner blue butterfly habitat does not exist. Maintenance activities may occasionally require minor disturbance of existing Karner blue butterfly/wild lupine habitat in the road ROW. These minor disturbances will likely enhance the growth of wild lupine and nectar plants and may actually benefit the Karner blue butterfly in the long-term.

Road ROW Vegetation Control. Vegetation control along highway ROWs is not expected to have long-term, adverse effects on Karner blue butterflies. As in other categories of land management activities, roadside vegetation control relies on both chemical (herbicide) and mechanical (mowing) applications. The DOT will follow herbicide and mowing guidelines specified in its conservation agreement. These guidelines will minimize any negative, long-term direct or indirect effects to the Karner blue butterfly and its habitat.

Utility Rights-of-Way Management

Utility right-of-way management activities are not expected to have significant, long-term impacts on the Karner blue butterfly or its habitat. The impacts of utility line construction and ROW corridor management is expected to have short-term impacts. Disturbance caused by these actions will likely enhance habitat for wild lupine and benefit the Karner blue butterfly in the long-term. Weaver Boos Consultants (1996) provide a review of potential impacts of utility ROW management practices on the Karner blue butterfly and its habitat. That report, and references cited therein, provide much of the basis for the discussion presented here.

Construction of New Pipelines. In areas with known Karner blue butterfly populations, construction will closely follow the partner's operating standards. Pipeline corridor construction sites are usually less than 100 feet wide and remain in a state of partial or complete defoliation for only a short period of time (three to four months, on average). Since this is a temporary condition of short duration and dimension, it is not anticipated that new pipeline construction would have significant, long-term, adverse impacts on Karner blue butterfly habitat.

HCP partners have agreed to a number of recommendations for reducing impacts to Karner blue butterfly habitat during pipeline construction including:

- Clearly marking the boundaries of known lupine and Karner blue butterfly populations occurring on the construction ROW and instructing construction personnel in the location and avoidance of these areas.
- To the extent possible, minimizing the size of the work area to reduce negative impacts on known Karner blue butterfly habitat and still retaining a safe work space in accordance with Occupational Safety and Health Administration standards.
- Stockpiling soils to avoid Karner blue butterfly-occupied lupine (when feasible).
- Restricting the movement of machinery and materials to a limited area that minimizes negative effects on the surrounding habitat while maintaining a safe work space.

Since pipeline construction requires the complete clearing and excavation of the ROW, all vegetation occurring in the area will be completely removed for a period of time. This could result in the incidental take of Karner blue butterflies occurring on lupine along the corridor route. In these cases, one or more of the partner's conservation strategies will be implemented to mitigate this loss, thus reducing the overall negative effects of the activities included in the Proposed Action alternative.

A possible alternative for a new corridor, of course, will be to re-route the corridor to avoid any Karner blue butterflies found during preliminary siting of the project (Weaver Boos Consultants 1996). Such an approach would clearly minimize adverse effects on the Karner blue butterfly. If all Karner blue butterfly populations cannot be avoided, then site-specific reclamation options will be reviewed. The actual reclamation option(s) chosen will vary depending on site-specific conditions such as the amount of habitat impacted and the estimated size of the resident Karner blue butterfly population. Efforts to minimize negative effects to Karner blue butterflies would likely be a part of any such reclamation options.

The disturbance caused by pipeline construction can ultimately benefit the Karner blue butterfly by opening areas of closed forest and exposing soil. This activity provides germination sites for lupine and nectar plant seeds and the open canopy favored by these species and the Karner blue butterfly.

Maintenance of Pipelines. Pipeline repair and maintenance activities in Karner blue butterfly habitat will follow procedures for new pipeline construction as put forth in Part C of Chapter II (pages 90-91). These procedures have been designed to minimize direct effects to Karner blue butterflies and indirect effects to the butterfly's habitat. Therefore, significant long-term adverse effects are not expected from pipeline maintenance.

HCP partners have agreed to take other steps as part of the Proposed Action alternative to minimize direct effects to the Karner blue butterfly and its habitat. For example, the movement of vehicular traffic off service roads will be contained to the minimum necessary for safe and effective inspection and repair of the pipeline. Karner blue butterfly, wild lupine and dense nectar plant colonies will be clearly documented by ROW partners to aid workers in the identification and avoidance of these areas.

If excessive disturbance of the soil/vegetation occurs, the HCP partners involved in pipeline maintenance have agreed to take measures to restore the site consistent with the individual partner's conservation agreements. In all likelihood, minor disturbances will enhance the growth of wild lupine and nectar plants by clearing new soil for seed germination, and it is anticipated will benefit the Karner blue butterfly in the long-term.

Construction of Transmission Lines. Utility power line construction is considered less detrimental to Karner blue habitat (in that there is minimal disturbance of the soil), when compared to pipeline construction activities (Weaver Boos Consultants 1996). In new construction an effort can be made to route around any Karner blue/lupine habitat areas thus reducing or eliminating direct effects on the Karner blue butterfly and its occupied habitat. Overhead power line construction's impact on the ROW or span corridor will be minimal and for the most part temporary. When a new ROW is cleared it actually enhances the potential for wild lupine and nectar plants to grow by creating open areas enabling the plants to grow and reproduce.

Maintenance of Transmission Lines. The effects of transmission line maintenance are similar to those from transmission line construction, with the exception that the route has already been established. It may be necessary to disturb existing Karner blue butterfly habitat to facilitate maintenance requirements (Weaver Boos Consultants 1996). These minor short-term disturbances may actually enhance the overall growth of lupine and nectar plants and benefit the Karner blue butterfly in the long-term. The utility partners have agreed to schedule maintenance of lines during the fall and winter months to reduce any direct impacts to Karner blue butterflies when possible (i.e. in fall and winter months, the butterfly is in a dormant egg stage, usually buried beneath the snow cover).

Vegetation Control in ROWs. Vegetation control in utility ROWs is not expected to have long-term, negative effects on the Karner blue butterfly or its habitat. Management is done with two major tools: herbicides and mechanical methods. The HCP partners have agreed to modify typical herbicide use and mechanical management practices to reduce the likelihood of adverse effects to Karner blue butterflies.

As discussed elsewhere, techniques for the application of herbicides can vary from the simple method of hand held applicators that allow treating one tree, shrub or stump individually or with a larger tank/vehicle unit to allow foliage treatment of large areas at once. Herbicide rotations can be up to several years between treatments. HCP partners using herbicides as part of the Proposed Action alternative have agreed to follow guidelines for herbicide use (see Appendix F). These guidelines are expected to minimize any adverse effects to Karner blue butterflies.

The mechanical method for ROW corridor maintenance is usually accomplished with some sort of machinery (e.g., a large mower). Setting the cutting heads to leave a minimum of six to eight inches of vegetation above ground after cutting will likely reduce any direct effects to Karner blue butterflies (Weaver Boos Consultants 1996; C. Carnes, Green Bay Field Office, USFWS, pers. comm.). Altering the timing of mowing, as the HCP partners have agreed to do in their conservation agreements, will also minimize direct effects to Karner blue butterflies (i.e. if the butterfly, in its various life stages, is not present at the time of mowing there will be no direct effects). The mowing cycle can occur on a three- to five-year rotation, allowing a minimum of one growing season between mowing. It is likely that mowing cycles of this frequency will maintain an open canopy that is suitable for lupine and nectar plant growth and reproduction. It is also expected that this frequency will allow Karner blue butterflies to recolonize mowing impacted sites from adjacent occupied sites (Weaver Boos Consultants 1996). The use of mechanized equipment to trim the trees along the edges of utility corridors can have an impact from the tires or tracks of the vehicle but effects of this nature should be very temporary and produce minimal long-term negative impact to the Karner blue butterfly/lupine habitat. Minor disturbances will likely enhance the growth of lupine and nectar plants by clearing the soil for seed germination and may actually benefit the Karner blue butterfly over the long-term.

e) Assessment of Risk from Private Landowner (Non-Partner) Inclusion Strategy

An assessment of risk to Karner blue butterflies from the private landowner inclusion strategy (i.e. those lands covered by the inclusion strategy discussed in Part F of Chapter II, pages 129-141) was conducted in February 1997. USGS quadrangle maps, county topographic maps, aerial photos, county soil maps and extensive personal agency staff knowledge of the involved areas were used to conduct an assessment of the relative risk to Karner blue butterfly conservation from activities on non-partner private lands.

Significant population areas (see Figure 2.11, page 131) roughly correspond to the viable populations and large viable populations identified in the draft Karner blue butterfly recovery plan. The larger areas of conservation emphasis (see Figure 2.11, page 131) encompass element occurrences and potential habitats and, therefore, potentially unidentified populations outside the significant population areas.

County plat books were used to derive the ratio of partner to non-partner land within each of the significant population areas and individual areas of conservation emphasis. Non-partner lands were then assessed to determine what potential might remain for Karner blue butterfly conservation within each of the significant population and conservation emphasis areas. Only a small amount of potentially suitable habitat is available on non-partner lands.

The results of this risk analysis on a county-by-county basis are presented in Table 5.1 (pages 309-310). Percentages in Table 5.1 show the amount of land that is in partner ownership in the significant population areas and the areas of conservation emphasis. Also provided in Table 5.1 is the percentage non-partner land with suitable habitat in each area. Since these numbers reflect different things, they do not sum to 100 percent. The preliminary risk assessment was followed by a more intensive analysis of potential risks due to agricultural activities on private lands. These analyses were documented in letters from the DNR to the USFWS.

Table 5.1. Percent Partner and Non-partner Landownership in Significant Population Areas and Areas of Conservation Emphasis (County-by-County Breakdown)

Adams County

Significant Population Areas
- Partner land 60%
- Other land with potential 4%

Area of Conservation Emphasis
- Partner land 50%
- Other land with potential 10%

Burnett County

Significant Population Areas
- Partner land 95%
- Other land with potential 0.1%

Area of Conservation Emphasis
- Partner land 60%
- Other land with potential 6%

Clark County

Significant Population Area
- Partner land 97%
- Other land with potential 0.5%

Area of Conservation Emphasis
- Partner land 90%
- Other land with potential 5%

Eau Claire County

Significant Population Areas
- Partner land 90%
- Other land with potential 1%

Area of Conservation Emphasis
- Partner land 60%
- Other land with potential 20%

Green Lake County

Significant Population Area
- Partner land 60%
- Other land with potential 4%

Area of Conservation Emphasis
- Partner land 60%
- Other land with potential 4%

Jackson County

Significant Population Areas
- Partner land 95%
- Other land with potential 2%

Area of Conservation Emphasis
- Partner land 85%
- Other land with potential 5%

Juneau County

Significant Population Areas
- Partner land: 100%
- Other land with potential 4%

Areas of Conservation Emphasis
- Partner land (North) 80%
- Other land with potential 5%
- Partner land (South) 50%
- Other land with potential 7.5%

Table 5.1. Percent Partner and Non-partner Landownership in Significant Population Areas and Areas of Conservation Emphasis (County-by-County Breakdown), Cont.

Monroe County

Significant Population Areas
- Partner land 100%

Area of Conservation Emphasis
- Partner land 85%
- Other land with potential 3%

Polk County

Area of Conservation Emphasis
- Partner land 50%
- Other land with potential 30%

Portage County

Significant Population Area
- Partner land 80%
- Other land with potential 6%

Area of Conservation Emphasis
- Partner land 30%
- Other land with potential 21%

Waupaca County

Significant Population Area
- Partner land 5-10%
- Other land with potential 38%

Area of Conservation Emphasis
- Partner land <5%
- Other land with potential 38%

Waushara County

Significant Population Areas
- Partner land 20%
- Other land with potential 16%

Area of Conservation Emphasis
- Partner land 5%
- Other land with potential 19%

Wood County

Significant Population Area
- Partner land 90%
- Other land with potential 4%

Area of Conservation Emphasis
- Partner land 70%
- Other land with potential 4.5%

The risk assessments indicate that *the vast majority of land included in the significant population areas and the areas of conservation emphasis are within partner ownership.* As expressed earlier, the majority of known Karner blue element occurrence occur on HCP partner lands. If the majority of element occurrences are located on partner lands and the majority of lands included in the significant population areas and areas of conservation ownership are owned by the partners, it is safe to conclude that there is a relatively low risk to Karner blue butterfly populations from activities engaged in on private lands that are not included in the HCP partnership. In other words, *activities occurring on private lands outside of partner lands have a low probability of significantly impacting butterfly populations.*

Since the significant population areas include all of the federal recovery areas for establishment of viable and large viable Karner blue butterfly populations, inclusion of small landowners in the permit *would not jeopardize* Karner blue butterfly recovery efforts. In addition, since the majority of lands in these areas are owned by HCP partners and the partners have committed to proactive conservation, including education and outreach to private landowners, issuance of an ITP and HCP implementation would *likely benefit* federal recovery efforts.

f) Cumulative Effects of Multiple Karner Blue Butterfly Management Activities

Karner blue butterfly conservation efforts are occurring in all the states encompassing the current range of the Karner blue butterfly. the majority of Karner blue butterfly populations across the range are located on federal and state lands, other public lands, or Nature Conservancy lands; these are lands where Karner blue butterfly recovery is targeted (USFWS 1997). Conservation efforts range-wide include habitat restoration activities, Karner blue butterfly monitoring and population augmentation. Karner blue butterflies were reintroduced to Ohio in 1998, bringing the number of states with extant occurrences of the butterfly to seven. A Safe Harbor approach to Karner blue butterfly conservation is currently being considered in northwest Ohio in concert with the reintroduction effort.

Six formal section 7 consultations pursuant to the ESA have been done by the USFWS on federally-related projects that affected the Karner blue butterfly in Wisconsin. Other consultations have been done in Michigan, Indiana and New Hampshire. Two larger consultations occurred in michigan with the U.S. Forest Service. All the consultations have resulted in project designs that minimized harm to the Karner blue butterfly and precluded jeopardizing the species. in addition, the USFWS has issued many section 10 permits across the species range for research and recovery-related work. for example, permits have been issued to niagara Mohawk in New York for conservation work along a power line ROW, to researchers in Wisconsin, michigan, Minnesota and Indiana investigating Karner blue butterfly habitat variables and restoration techniques, to the New York Department of Environmental Conservation relative to recovery efforts and to the Wisconsin DNR for habitat management/improvement and Karner blue butterfly monitoring activities. the cumulative effect of the federal consultation and permit

activities has been significant relative to the resultant gains in conservation and protection of the species across its range. It is anticipated that such conservation and recovery efforts will continue into the future, on a case-by-case basis, through subsequent section 7 consultations and section 10 permits.

In addition to the broad conservation strategies included in the Proposed Action alternative, there are several other Karner blue butterfly conservation efforts occurring in Wisconsin. Four current efforts are discussed below. These activities complement efforts outlined in the HCP in a number of ways. *Given the variety of conservation efforts underway and the adaptive management opportunities such a situation creates, the likelihood of adverse impacts to Karner blue butterflies from the Proposed Action alternative is significantly minimized in Wisconsin.*

Fort McCoy Karner Blue Butterfly Conservation Plan (Section 7 Consultation)

Fort McCoy is a military installation located in Monroe County in west-central Wisconsin. The primary mission of Fort McCoy is threefold: (1) to provide facilities and support services necessary to train all components of the United States Army (active and reserve) as well as the other armed forces; (2) to provide a mobilization site for reservists and National Guard members in time of war or national emergency; and (3) to provide support and coordinating assistance to the U.S. Army Reserve nationwide. The 1994 population at Fort McCoy totaled approximately 2,500 individuals, and the facility annually provides training for more than 100,000 troops.

A Karner Blue Butterfly Conservation Plan (Wilder 1995) for Fort McCoy was approved in 1995 after the USFWS issued a biological opinion stating that activities occurring at Fort McCoy were not likely to jeopardize the continued existence of Karner blue butterflies, providing, among other measures, that a conservation plan was developed for the butterfly. The Fort's conservation plan includes management recommendations for a roadside mowing program, dispersal corridors, and core population areas within the Fort's boundaries. Karner blue butterflies have been documented on the Fort since 1990. A little over 3,800 acres of lupine habitat are known to occur on Fort McCoy, most of which is occupied by Karner blue butterflies. The Fort McCoy plan calls for increasing the *quality* of Karner blue butterfly habitat rather than the *quantity* of habitat. It also includes a checklist to guide the assessment of compliance with the plan.

The Fort McCoy plan will assure Karner blue butterfly habitat persists in an area that is key to the federal recovery planning effort. The Fort is incorporating recovery goals into management plans for the base as called for in the *Karner Blue Butterfly Working Draft Recovery Plan* (USFWS 1997). In addition, natural resources staff from Fort McCoy have been involved in the Wisconsin Karner Blue Butterfly HCP process and have participated on the HCP Biological Team. It is anticipated that they will continue to be involved in discussions with the HCP partners. As such, Karner blue butterfly conservation will benefit from the shared experiences of both efforts.

Volk Field Karner Blue Butterfly Conservation Plan (Section 7 Consultation)

Volk Field Combat Readiness Training Center is located in west-central Wisconsin near the village of Camp Douglas in Juneau County. The base contains a little over 2,258 acres leased from the state of Wisconsin. The base provides year-round flying and mission support training for the Air National Guard and other defense units. In addition, Volk Field operates a 7,928 acre Hardwood Air to Ground (Bombing) Range just north of Finley. The range is used to train combat aircrews and provides a realistic air-to-ground weapons training environment. Leased to the federal government, the land is owned by both the state and the county. Juneau County, however, has natural resources management responsibility on the range.

Wild lupine is present at both Volk Field and the Hardwood Range. Karner blue butterflies have not been documented at Volk Field, but they have been found in almost all wild lupine stands in the impact area of the bombing range (Gonnering 1995). A Karner Blue Butterfly Conservation Plan is being developed for Volk Field and the Hardwood Range under the federal consultation provisions of the ESA as previously described. The USFWS will review the plan when it is finished and prepare a biological opinion.

Like the Ft. McCoy plan, the Volk Field and Hardwood Range plan will ensure Karner blue butterfly habitat persists by continuing disturbance regimes. Activities under the plan would be consistent with the *Karner Blue Butterfly Working Draft Recovery Plan* (USFWS 1997). In addition, staff from the Natural Resources Office at Volk Field have been involved in the Wisconsin Karner Blue Butterfly HCP process and have participated on the HCP Biological Team. It is anticipated that they will continue to be involved in discussions with the HCP partners. As such, Karner blue butterfly conservation will benefit from the shared experiences of both efforts.

Town of Rome HCP

The town of Rome in Adams County recently prepared an HCP and incidental take permit application (USFWS 1999). The town plans to reconstruct 4.25 miles of an existing roadway (Badger Avenue) which includes construction work in the associated road ROW. An approximately 2.5-mile segment of the roadway project area includes patches of habitat occupied by Karner blue butterflies. The USFWS is currently proposing to issue a 20-year permit to include the limited take of occupied habitat for the road construction project and subsequent mowing program, compensation for take through appropriate minimization and

mitigation measures, and implementation of a post-construction monitoring program to measure the success of the minimization and mitigation measures. A USFWS decision on the town of Rome application is expected in mid-1999.

The USFWS has worked closely with the town to ensure Karner blue butterflies are not significantly affected by the proposed road project. Site-specific conservation measures undertaken to minimize and mitigate adverse effects will complement measure taken as part of broader efforts included in the statewide HCP. In addition, it is anticipated that the USFWS will share results of the town's monitoring activities with the DNR and other HCP partners, particularly those partners involved in transportation management. As such, Karner blue butterfly conservation will benefit from the shared experiences of both efforts.

Federal Recovery Planning

As discussed in Part F of Chapter II (pages 147-151), the USFWS is leading a federal recovery planning effort. Several HCP partners are involved in the federal recovery planning process. Although the HCP partners do not have federal recovery responsibilities, the DNR's multiple roles as the lead applicant for the HCP/ITP and as a participant in the federal recovery effort can help assure coordination of the various efforts in Wisconsin.

The activities outlined in the HCP are consistent with measures included in the *Karner Blue Butterfly Working Draft Recovery Plan* (USFWS 1997). The significant population areas and areas of conservation emphasis used in HCP's non-partner inclusion strategy include all of the federal recovery areas for establishment of viable and large viable Karner blue butterfly populations. Since the majority of lands in these focus areas are owned by HCP partners and the partners have committed to proactive conservation, issuance of an ITP and HCP implementation would *likely benefit* federal recovery efforts.

Conclusion

A significant amount of effort is underway to promote Karner blue butterfly conservation in Wisconsin and across the species' range. The variety of efforts and the large number of players creates tremendous opportunities for learning. *Given the variety of conservation efforts underway and the adaptive management opportunities such a situation creates, the likelihood of any adverse effects to Karner blue butterflies from the Proposed Action alternative is significantly minimized in Wisconsin.*

g) Other Endangered and Threatened Species

Potential impacts of the land management activities included in the Proposed Action alternative (see Chapters II and III) to both federally and state-listed plant and animal species were predicted based on the known distribution and habitat preferences of the rare species relative to the affected environment. It is assumed that there will be no significant impact to species that do not occur within the documented Karner blue butterfly range (i.e. if the species is not within the affected environment, it will likely not be affected by the Proposed Action alternative). For species that occur within the affected environment, an analysis of proposed management activities on each affected species and its habitat was completed. The analysis relies heavily on the scientific literature and the professional judgement of biologists familiar with the species involved.

Federally-Listed Species

As described in Chapter IV (pages 252-255), there are eight animals and six plants, in addition to the Karner blue butterfly, that are federally-listed as endangered or threatened in Wisconsin. One species, the Canada lynx, was recently proposed for listing as a threatened species (USFWS 1998b). *Issuance of an ITP for the incidental take of Karner blue butterflies will not allow for the incidental take of other federally-listed species.* As discussed below, currently only the timber wolf, Kirtland's Warbler and Bald Eagle could potentially be impacted by partner activities, however, the potential for impact is low. In order to preclude impacts to these species, the DNR will provide the partners with the locations of Bald Eagle nests, Kirtland's Warbler sites and wolf packs, dens and rendezvous sites known to occur on partner lands or to be potentially impacted by partner activities. As these occurrence lists do not necessarily capture all extant sites, partners are responsible for coordinating with he USFWS and/or the DNR when proposing activities in potential habitat for these species.

The USFWS will assist the HCP partners in efforts to avoid impacts to the species. If impacts may result from an activity, the partner will need to apply for an ITP from the USFWS to authorize any potential take that may occur. Similarly, private landowners in the voluntary category (see Part F of Chapter II, pages 129-141) would also only be covered for the take of Karner blue butterflies. If take of other federally-listed species may occur as a result of their activities, the landowner will need to pursue a separate authorization from the USFWS to cover any potential take of listed species that may result from the activity. relative to species that may become federally-listed during the duration of an ITP, the USFWS, will promptly advise the DNR and partnership of these species and advise the partnership of potential permit needs relative to these species (see Part I of Chapter II, page 181, for more information on amendments for future species listings).

Canada Lynx. The Canada lynx (*Lynx canadensis*), because of its very limited range in northern Wisconsin and few occurrence in the state during the last decade, is not anticipated to be affected by HCP partner activities.

Timber Wolf. The Wisconsin timber wolf (*Canis lupus*) range is currently restricted to Florence, Forest, Lincoln, Oneida, Price, Rusk, Sawyer, Taylor, Iron, Ashland, Bayfield, Douglas, Sawyer, Washburn, Burnett and Polk counties in the north, and Clark, Eau Claire, Jackson, Monroe, Juneau and Wood counties in the central part of the state. As the wolf population continues to increase, this range may expand and overlap the Karner blue butterfly's documented range in Burnett, Clark, Jackson and Wood counties. The USFWS plans to propose down-listing timber wolves to threatened status or delisting in Wisconsin during 1999. It is not anticipated that management activities included in the HCP would adversely impact timber wolves in Wisconsin since much of their range is outside lands owned and managed by partners.

Timber wolves do not seem to have specific habitat preferences (other than a lack of well-traveled roads), therefore alteration of habitat resulting from the Proposed Action alternative should have no significant impact on this species. The only likely exception to this could be the disturbance or loss of den and rendezvous sites due to forest land management activities. Currently, county land managers (e.g., Jackson and Burnett counties) are coordinating with the DNR on the locations of such sites and implementing guidelines developed to avoid harming these sites during logging operations. If wolf dens or rendezvous sites could be affected by logging operations, such activities would be subject to USFWS incidental take permitting procedures since no authorization for take of timber wolves is being proposed in the HCP.

Peregrine Falcon. Activities proposed as part of the HCP will not significantly impact the Peregrine Falcon (*Falco peregrinus*). Peregrine breeding and nesting occurs only at or near release sites in Madison and Milwaukee, at Devil's Lake State Park and along the Mississippi River. Activities outlined in the HCP are not planned for any of these breeding or nesting locations. In August 1998, the USFWS proposed delisting the Peregrine Falcon in North America (USFWS 1998a).

Piping Plover. Similarly, activities outlined in the HCP will not significantly impact the Piping Plover (*Charadius melodus*). The only breeding Piping Plovers in Wisconsin in recent years have occurred along the shores of Lake Superior. All these areas are a considerable distance from the affected environment and will not be impacted by any of the activities included in the Proposed Action alternative.

Kirtland's Warbler. Kirtland's Warbler (*Dendroica kirtlandii*) have a highly specific nesting requirement of jack pine barrens. Jack pine (*Pinus banksiana*) must predominate and be young to middle-aged (ranging 1.3 to 6 m in height). Kirtland's Warbler has been found only a few times in Jackson, Douglas, Washburn, Vilas, Marinette and possibly Juneau counties, but only as a

non-breeding species (i.e. only singing males). Should introduction of this species to sites outside its natural range in Michigan be conducted as recommended in the Kirtland's Warbler Recovery Plan (USFWS 1976), jack pine management practices are generally believed suitable for provision of habitat (Tilghman 1978).

It is anticipated that proactive management for the Karner blue butterfly, particularly barrens, prairie and savanna management activities, would be compatible with Kirtland's Warbler recovery efforts. Jack pine in the 1.3 to 6 m height range are not typically harvested as part of the land management activities included in the Proposed Action alternative. As such, no significant effects of this type to Kirtland's Warbler are expected from forest management activities. Placement of campgrounds or intrusive recreational use of occupied habitat (e.g., ATV use) may adversely affect the Warbler. If such activities are anticipated to occur, partners would need to coordinate with the USFWS on avoidance scenarios or any potential permit needs.

Bald Eagle. In Wisconsin, Bald Eagles (*Haliaetus leucocephalus*) nest along the shores of inland lakes and rivers, with the largest breeding concentrations in the northern third of the state (Gieck 1991). The vast majority of eagle nests are found outside the Karner blue butterfly's documented range. In addition, the Bald Eagle has recovered so well in Wisconsin (USFWS 1995) that it was recently removed from the state endangered species list. The USFWS plans to propose delisting of Bald Eagles during 1999. However, upon delisting, as now, the Bald Eagle will be protected by the Migratory Bird Treaty and Bald Eagle Acts. These laws protect the Bald Eagle by prohibiting, except under certain specified conditions, the take, possession and commerce of migratory birds, their parts, eggs or nests.

Some land management activities included in the Proposed Action could adversely affect Bald Eagle nesting success if conducted in areas where Eagles are nesting. This situation is not expected. However, if Bald Eagles are found to occupy lands subject to management by partners under the HCP, anticipated effects will be addressed through a consultation process with the USFWS.

Hine's Emerald Dragonfly. In Wisconsin, the Hine's emerald dragonfly (*Somatochlora hineana*) is found only in Door County, a considerable distance from the affected environment. None of the activities proposed as part of the HCP will impact the Hine's emerald dragonfly.

Higgins' Eye Pearly and Winged Mapleleaf Mussels. None of the activities proposed as part of the HCP will impact the Higgins' eye pearly mussel (*Lampsilis higginsi*) or the winged mapleleaf mussel (*Quadrula fragosa*). These endangered mussels are restricted to river habitats that will not be significantly affected by the Proposed Action alternative.

Northern Monkshood. Northern monkshood (*Aconitum noveboracense*) occurs in mixed forests in the Driftless Area, outside the documented Karner blue butterfly range. None of the activities partners propose to engage in as part of the Proposed Action alternative will impact northern

monkshood.

Dune (Pitcher's) Thistle. Dune thistle (*Cirsium petcheri*) is found growing only on sand dunes along the Lake Michigan shoreline in northeastern Wisconsin. Sites where the dune thistle is found are located outside the affected environment and will not be significantly impacted by any part of the Proposed Action alternative.

Dwarf Lake Iris. Similarly, dwarf lake iris (*Iris lacustris*) occurs in thin, moist, sandy or rocky soils near the Lake Michigan shoreline. All known dwarf lake iris sites are located outside the affected environment and will not be significantly impacted by any part of the Proposed Action alternative.

Eastern Prairie Fringed Orchid. Eastern prairie fringed orchid (*Platanthera leucophaea*) populations occur in wet to medium-wet prairies, wet meadows and bogs. Records of prairie white-fringed orchid are restricted to southeastern Wisconsin, outside the area of the affected environment. No part of the Proposed Action alternative will have significant impacts on prairie white-fringed orchid.

Prairie Bush Clover. The prairie bush clover (*Lespedeza leptostachya*) is found in dry to medium moist prairies with full sun. The soils in these areas are often gravelly or sandy. In Wisconsin, prairie bush clover is found in only about six sites in the southern and western parts of the state. None of these are in areas affected by activities outlined in the HCP.

Fassett's Locoweed. In Wisconsin, Fassett's locoweed (*Oxytropis campestris* var. *chartacea*) is found on the gravelly or sandy shores of hard water lakes. It is known only from the shores of a few shallow lakes in central Wisconsin, from sites exposed to full sunlight and subject to widely fluctuating water levels. This is not a habitat that will likely be impacted by the Proposed Action alternative. No significant impacts to Fassett's locoweed are anticipated.

State-Listed Species

Wisconsin's endangered and threatened species list currently includes 101 animals (two mammals, 26 birds, one amphibian, nine reptiles, 21 fishes, 20 insects and 22 mollusks) and 138 vascular plants. These species occur in a wide variety of habitats and occupy a tremendous array of ecological niches. Some of these rare species are associated with Karner blue butterflies or their habitat (see Sections 5 and 6 in Part B of Chapter IV, pages 255-263). Some rare species have overlapping ranges with the Karner blue butterfly, but are found in distinctly different habitat types. Other species do not share overlapping ranges with the Karner blue butterfly documented range. Kirk (1996) and Borth (1997) examined some of the potential impacts to some rare species associated with the Karner blue butterfly and its habitat in Wisconsin (see Appendix B). For some species that occupy the same habitats as the Karner blue butterfly, it is

generally believed that long-term perpetuation of the habitat will result either result in minimal negative effects or in more secure populations in spite of any short-term losses resulting from individual management actions. Those species whose management is believed to be compatible with management for Karner blue butterflies are identified in Table 5.2 (page 321).

For an assessment of potential impacts to state listed species, all endangered and threatened species known to occur in the Karner blue butterfly's high potential range, as well as all endangered and threatened species known to occur on all partner lands outside of the high-potential range, were included. The source of these data was the Wisconsin Natural Heritage Inventory.

The anticipated impacts to state listed species known to occur, or likely to occur, on partner lands in the high potential range can be grouped into three categories:

- those where neither positive or negative impacts are expected,
- those where negative impacts, if any, are expected to be short-term or not significant to the species' state or regional population, and
- those where negative impacts could be significant for one or more of the proposed management activities.

The first category includes most of the rare species known to occur, or likely to occur over the next ten years, on partner lands within the Karner blue butterfly's high potential range. These species are not expected to experience any significant impacts, positive or negative, as a result of the Proposed Action alternative. Typically, this is due to the fact that these species' habitat needs are not associated with Karner blue butterfly, pine/oak barrens or dry, sandy soils. Species falling into this category are listed in Table 4.1 (pages 257-258). *The DNR does not intend to authorize any incidental take of the species listed in Table 4.1 (pages 257-258) because no significant adverse effects are anticipated as a result of HCP implementation.* Any actions resulting in the take of these species remain subject to the state's endangered species law and will need to be reviewed on an individual basis.

Several of the rare species known to occur, or likely to occur, on partner lands within the Karner blue butterfly's high potential range are closely associated with the Karner blue butterfly and are expected to experience similar positive benefits as a result of the Proposed Action alternative. These species are included in the second category. As with the Karner blue butterfly, some of these species are dependent upon disturbance of their existing occupied habitat which, although resulting in the incidental take of individuals or populations, benefits the species over the long-term. Other species in this second category are those for which any taking would be limited, both in terms of frequency of occurrence as well as the magnitude of the taking. That is, although there will likely be no positive benefit to the species, any takings will not be substantial and are not expected to result in any long-term harm to the species' distribution or status in the state. Species falling into this category are listed in Table 5.2 (page 321).

It is the DNR's conclusion that any incidental take of the species listed in Table 5.2 (page 321) which may result from HCP implementation:

- is not likely to jeopardize the continued existence and recovery of these listed species, or the whole plant-animal community of which they are a part, within the state;
- is not likely to result in the destruction or adverse modification of habitat determined by the DNR to be critical to the species' continued existence within the state; and
- is justified by the benefit to public health, safety or welfare.

As such, *it is the DNR's intent to authorize the incidental take of these species in the Karner blue butterfly's high potential range, or other areas approved by the DNR, in the following situations*:

- incidental take that results from management actions conducted in the course of implementing the HCP,
- incidental take that takes place on partners lands, and
- incidental take that results from management actions conducted by the partners or the activities of voluntary participants under the non-partner participation strategy.

For some listed species, certain management activities and guidelines described in the HCP may cause the loss of populations or individuals that may have a significant impact on the species in Wisconsin. For this third category of species, given their life history needs and the nature of the management activity, further review is necessary to ensure that adverse impacts are minimized and that any incidental take is acceptable. It is quite possible that, as a result of this further assessment, the activities (and subsequent take) may be authorized, but blanket authorization is not appropriate at this time. Species falling into this category are identified in Table 5.3 (page 321).

Take of the species identified in Table 5.3 will not be authorized. The DNR will provide HCP partners with a listing of known element occurrences of these species on partner lands. The number of known occurrences on partner lands is small. Individual partners will be responsible for determining if any of the known element occurrences are located on lands planned for management under the HCP. Management activities proposed where these species occur will require individual consultation with the DNR to resolve any potential incidental take and will likely require some form of annual monitoring and reporting. As new information becomes available, and management guidelines are developed and revised, the DNR may re-evaluate decisions relative to authorization. As guidelines are completed, they will be shared with HCP partners and the DNR may reconsider options for incidental take.

Table 5.2. State Listed Species for which HCP Implementation is Expected to Have Little, if Any, Long-term Negative Effects

Species name	Common name	State Status
Clemmys insculpta	Wood turtle	Threatened
Ophisaurus attenuatus	Western slender glass lizard	Endangered
Sistrurus catenatus	Eastern massasauga rattlesnake	Endangered
Ammodramus henslowii	Henslow's sparrow	Threatened
Lanius ludovicianus	Loggerhead shrike	Endangered
Tympanuchus cupido	Greater Prairie-chicken	Threatened
Vireo bellii	Bell's vireo	Threatened
Oarisma powesheik	Powesheik skipper	Endangered
Speyeria idalia	Regal Fritillary	Endangered
Ascelpias lanuginosa	Wolly milkweed	Threatened
Ascelpias ovalifolia	Dwarf milkweed	Threatened
Ascelpias sullivantii	Prairie milkweed	Threatened
Cacalia tuberosa	Prairie Indian plantain	Threatened
Cirsium hillii	Hill's thistle	Threatened
Echinacea pallida	Pale-purple coneflower	Threatened
Gentiana alba	Yello gentian	Threatened
Lespedeza virginica	Slender bush-clover	Threatened
Liatris punctata var. nebraskana	Dotted blazing star	Endangered
Polytaenia nuttallii	Prairie parsley	Threatened

Table 5.3 State Listed Species for which HCP Implementation is Expected, for at Least Some Management Activities, to Result in Incidental Take that *May Not* Meet Listed Criteria

Species name	Common name	State Status
Empidonax virescens	Acadian flycatcher	Threatened
Dendroica cerulea	Cerulean warbler	Threatened
Wilsonia citrina	Hooded warbler	Threatened
Oporornis formosus	Kentucky warbler	Threatened
Buteo lineatus	Red-Shouldered hawk	Threatened
Aflexia rubranura	Red-Tailed prairie leafhopper	Threatened
Polyamia dilata	a prairie leafhopper	Threatened
Schinia indiana	Phlox moth	Endangered
Incisalia irus	Frosted elfin	Threatened

3. Effects on the Socio-Economic Environment

Human Population and Housing

The Proposed Action alternative would not affect the rate or amount of population growth or housing construction. There would be no significant impact on the age structure or education levels of the human population living in the area of the affected environment.

Approval of the Proposed Action alternative would remove the ESA constraint posed by the presence of the Karner blue butterfly on partner land management and development activities captured in the HCP during the 10-year permit period. Construction activity and economic development would continue in the permit area on non-partner lands. However, sites with Karner blue butterflies would be subject to coverage only through the participation strategy described in Part F of Chapter II. Growth in the area of the affected environment would be expected to follow recent trends (see Chapter IV, pages 264-273). Unwillingness to or disinterest in participating in this participation strategy, however, could affect the location of some developments.

Socio-Economic Patterns

Issuance of an ITP and implementation of the HCP would not significantly affect household or per capita income within the area of the affected environment. Nor would it likely impact employment opportunities in the area.

Annual costs for implementing the HCP if an ITP is issued have been estimated at nearly $600,000 above the normal costs associated with land management activities. These expenses would be borne by the partners as a part of their operating expenses. While these expenses are relatively small when spread out over the 27 partners, these costs represent a significant contribution toward Karner blue butterfly conservation.

Implementation of the *Wisconsin Statewide Karner Blue Butterfly HCP* will impose a $50.00 application fee and a $2,500.00 inclusion fee on entities wishing to join the partnership and have permit coverage extended. One-time permit applicants will be charged a flat fee of $5,000, or five percent of the value of the project or activity to be undertaken, whichever is less. These expenses would be borne by the new partners or one-time applicant as a part of their operating expenses. Compared to most annual operating budgets, these costs represent relatively insignificant expenses.

Land Use

The Proposed Action alternative would not significantly affect land use on federal lands, because it does not propose any changes to existing land use or regulation on federal lands. The Proposed Action alternative would also not significantly affect land uses on non-federal lands, which are guided by underlying local and state land use regulations and policies. The implementation of the Wisconsin Karner Blue Butterfly HCP would provide general benefits to otherwise allowable land uses that were constrained by the presence of the Karner blue butterfly by removing the prohibition of take (for the voluntary category) and provide a stream-lined permit process for future partners which could include municipalities and subdivision developers.

Land use activities which occur primarily on non-federal lands would either benefit greatly from approval of the plan or at worst be neutrally affected. In general, landowners would be able to make economic benefit sooner than if they were to wait for the Karner blue butterfly to disappear through expected local extinction processes (i.e. natural succession).

Activities included in the Proposed Action alternative will likely not affect land conversion patterns or rates. The Proposed Action alternative allows for the transfer of lands. Issuance of the proposed incidental take permit could affect the pattern of development, but ultimately would not affect the rate or amount of growth expected within the affected area.

Property Values

Issuance of an ITP and implementation of the HCP would help maintain the economic values of properties where Karner blue butterflies occur. The HCP would allow for the continued economic use of private properties for such otherwise legal activities as forestry, recreation and development. ITP coverage could help maintain property values in cases where land ownership is transferred between parties.

Transportation

Issuance of an ITP and implementation of the HCP would likely have a positive impact on transportation management in Wisconsin. By addressing Karner blue butterfly conservation up front on a statewide basis, as outlined in the Proposed Action alternative, the DOT will be able to proceed with planned highway improvement and maintenance projects without costly delays or additional permitting processes. In the absence of a statewide ITP, the DOT would be required to seek authorization from the USFWS for each improvement and maintenance project.

In addition, it is anticipated that the enhanced conservation efforts along highway ROWs will directly benefit Karner blue butterflies by maintaining wild lupine populations, communities of

nectaring plants and Karner blue butterfly dispersal corridors.

Cultural and Historical Resources

Part A of Chapter II (page 43) provides a synopsis of historical and cultural resources present in the state. The distribution of cultural and historic resources is entirely independent of the distribution of the Karner blue butterfly in Wisconsin. Under the Proposed Action alternative, those cultural and historical resources in the area of the affected environment would continue to be protected and managed under applicable local, state and federal historic preservation policies and laws.

The State Historical Society's Division of Historic Preservation administers programs that promote the preservation, protection and use of prehistoric and historic properties, including the Register of Historic Places. Established in 1989, the State Register of Historic Places lists state resources important because of their historical, architectural, engineering, archeological or cultural significance. The list includes districts, sites, buildings, structures and objects that are significant on the national, state and local level; it also serves as the "trigger" for state historic preservation benefits and protection. Similarly, the National Register of Historic Places, maintained by the National Park Service since 1966, includes properties of national, state and local significance. The National Register includes more than 1,600 Wisconsin entrees, representing about 15,000 individual historic or prehistoric properties.

To some degree, all levels of government must consider the preservation and protection of historic and prehistoric properties when undertaking or permitting certain projects. In addition, individual property owners may also provide protection for such properties. Federally-funded, licensed or permitted projects, such as the construction of highways or wastewater treatment facilities, are subject to review under Section 106 of the National Historic Preservation Act. Similarly, state law requires state agencies to consider the potential effects of proposed state actions on historic properties. If any adverse effects on historic properties appear likely to result from a project, state agencies may have to negotiate with the State Historical Society to reduce such effects. State law also requires local governments to determine how their actions may affect historic properties. They must consider historic properties when planning for facilities development or when taking any actions, including allowing demolitions, sales, leases or rehabilitations, that affect historic properties they own. Local governments must notify the State Historical Society of such proposed actions, and negotiation may be required to attempt to mitigate any adverse effects proposed projects will inflict on historic properties. Also, local governments must notify the State Historical Society prior to allowing the demolition of historic buildings. Many communities have enacted local historic preservation

or landmarks ordinances that establish historic preservation commissions. Such commissions are empowered to review building permits and approve or disapprove, or at least delay, proposed changes or demolitions involving designated historic building sites and districts.

Both Wisconsin and the federal government offer investment tax credits for rehabilitating historic buildings. The income tax credits are designed to encourage and assist property owners who appropriately restore and reuse historic buildings. Those who own sites identified in the State Register or National Register, as well as those designated locally through a historic preservation or landmarks ordinance, may use Wisconsin's Historic Building Code. The Historic Building Code permits a flexible and cost-effective approach to rehabilitating historic buildings. The code allows a building to retain its distinctive historical features while ensuring the health and safety of the people who occupy and visit the building. The Wisconsin Department of Workforce Development administers the Historic Building Code.

The State Historical Society also administers the State Archeology Program and the Burial Sites Preservation Program. The state archeology program coordinates archeological research and the recording and mapping of archeological resources. It also administers a field archeology permit system and includes property tax exemptions for designated archeological sites. The burial sites preservation program provides protection for human burial sites. Wisconsin law establishes penalties for disturbing any such sites without appropriate permits. The law also allows local governments to use zoning and other methods, such as easements, to protect burial sites. If an activity inadvertently exposes a burial site, the State Historical Society must be notified before the activity proceeds. Like historic and archeological resources, cataloged burial sites may be eligible for tax credits.

Implementation of the Proposed Action alternative would likely have no direct effects on historical or cultural resources. None of the activities proposed by the partners are expected to affect historic buildings, historic districts, archeological sites or burial sites. If a partner proposes or engages in management activities that would affect one of these resources, the applicable laws would remain in effect.

B. Effects of the No Action Alternative

1. Effects on the Physical Environment

Geology and Soils

The range of activities included in the No Action alternative would not significantly impact geological features in the area of the affected environment. There are relatively few unique geological resources located in the area of the affected environment. Activities conducted, as outlined in the No Action alternative, would not likely involve extensive or large-scale manipulation of geological features.

Some land management activities which would be carried out under the No Action alternative could adversely affect long-term soil productivity through erosion (surface erosion and mass wasting), displacement and compaction, and alteration of chemical composition and biological soil communities. Other land management activities carried out under the No Action alternative could augment soil productivity through the enhancement of soil productivity and maintenance of forest plant cover. The likely impacts of the No Action alternative are the same as those for the Proposed Action alternative and would exist whether or not an ITP is issued.

Topography and Drainage

Activities included in the No Action alternative will not significantly impact topological and drainage features in the area of the affected environment. None of the management activities involve extensive manipulation of topological features. Changes in drainage features involving navigable waters would be subject to permitting under Chapter 30, *Wis. Stats.* The likely impacts of the No Action alternative on topography and drainage are the same as those for the Proposed Action alternative and would exist whether or not an ITP is issued.

Water Quality

Activities included in the No Action alternative would not significantly impact water quality in the area of the affected environment. The land management activities outlined in this alternative can all be conducted using best management practices to prevent water quality degradation. Other activities occurring in the affected environment (e.g., some agricultural practices, urban development, etc.) are far more likely to impact water quality. The likely impacts of the No Action alternative on water quality are the same as those for the Proposed Action alternative and would exist whether or not an ITP is issued.

Climate and Weather

Activities included in the No Action alternative will not significantly impact climate or weather conditions in the area of the affected environment. None of the land management activities involve actions that would significantly alter local or regional conditions. Any climate or whether impacts associated with the No Action alternative would exist whether or not an ITP was issued.

Air Quality

Activities included in the No Action alternative would not likely have significant impacts on air quality in the area of the affected environment. None of the land management activities involve actions that would significantly alter regional conditions. The likely impacts of the No Action alternative on local air quality are the same as those for the Proposed Action alternative and would exist whether or not an ITP is issued.

2. Effects to the Biological Environment

a) Plant Communities

Wisconsin plant communities are described in the report *Wisconsin's Biodiversity as a Management Issue* and are summarized in Part A of Chapter II and Chapter IV. Wisconsin has extensive forest cover roughly equal to that in place at Euro-American settlement (however, the forest today differs considerably in age structure and species composition). Barrens, savannas and prairies exist only in small acreages in scattered locations. Management activities included in the No Action alternative will occur primarily on lands that support these communities (forest, barrens, prairies and savannas).

Under the No Action alternative, a net gain in acres of mature forest communities might be expected since management activities in early successional communities would be limited by the ESA restrictions on take. On the other hand, the No Action alternative could result in further fragmentation of mature forest acreage as land owners continue to harvest trees in areas where they will not be subject to take prohibitions (e.g., interior forest areas with distinctly closed canopies away from sandy soils).

Early successional communities would be negatively impacted by the No Action alternative. Under this alternative, a net loss of barrens, prairie and savanna habitats could be expected since landowners and users would likely avoid such areas. Such a loss could be viewed as a negative impact due to low acreage of these communities remaining in the state.

b) Effects on Karner Blue Butterfly Populations

Under the No Action alternative, no statewide ITP would be issued by the USFWS. Individual partners would likely pursue their own ITPs in order to continue their management activities. No broad, proactive conservation strategies would be applied across the landscape; lands under diverse ownership and management would not be brought together in a coordinated manner for the purposes of conserving Karner blue butterfly habitat. Given the distribution of Karner blue butterflies on the Wisconsin landscape and their dependence on land disturbing activities, the No Action alternative would likely have a negative impact on conservation of the Karner blue butterfly.

It is impossible to know if specific commitments of lands for Karner blue butterfly conservation would be made under the No Action alternative. It is not likely, however, that 264,916 acres of lands would be committed to Karner blue butterfly conservation, and it is unlikely that 181,222 acres of public lands would be committed to Karner blue butterfly conservation. Innovative conservation approaches, such as adaptive management, which are best applied on a landscape basis would largely be precluded by the No Action alternative. At best, the No Action alternative would lead to a fragmented approach to conservation.

In the absence of the HCP partnership, there would not be agreed upon conservation guidelines and conservation protocols for specific land management activities implemented on a landscape scale basis. The monitoring and auditing procedures agreed to in the Proposed Action alternative would be absent as there would be no institutional structure in place to manage these processes (i.e. there would be no IOC or HCP Coordinator). Similarly, institutional mechanisms for identifying research needs and priorities would be absent.

Under the No Action alternative, there would be no statewide land owner participation strategy (as outlined in Part F of Chapter II, pages 129-142). There would be no means of ensuring ESA compliance over large acreages; the USFWS would need to deal with individual landowners and users on an one-to-one basis. There would likely be no substantial commitment of partner resources for public outreach, education and assistance efforts. At best, a limited number of target audiences could be approached to pursue Karner blue butterfly conservation.

The continued succession of habitats with open canopies to climax communities with closed overstory canopies would likely eliminate wild lupine and nectaring plants from some sites where Karner blue butterflies are now abundant. In the absence of a statewide HCP and ITP, there would be little incentive to ensure that land disturbance patterns are coordinated between different ownerships (i.e. there would be no shifting mosaic conservation strategy). The landscape would continue to be dynamic, but in a manner that may or may not promote occupation of new habitat sites by Karner blue butterflies.

c) Other Endangered and Threatened Species

Biologists examined the distribution of state and federally-listed and proposed endangered and threatened species relative to the affected environment. There is little overlap between the documented Wisconsin ranges of endangered and threatened species and the affected environment. Under the No Action alternative, individual land owners would continue to be subject to federal and state endangered species laws and regulations. As such the impacts of the No Action alternative to listed species are similar to those of the Proposed Action alternative.

Federally-Listed Species

As described in Chapter IV (pages 252-255), there are eight animals and six plants — in addition to the Karner blue butterfly — that are federally-listed as endangered or threatened in Wisconsin. There is currently also one species proposed for federal listing as threatened. It is unlikely that the No Action alternative would have significant impacts on federally-listed and proposed endangered or threatened species, other than the Karner blue butterfly. The potential impacts to federally-listed and proposed endangered and threatened species are similar to the potential impacts from the Proposed Action alternative (see pages 315-318).

State-Listed Species

Wisconsin's endangered and threatened species list currently includes 101 animals (two mammals, 26 birds, one amphibian, nine reptiles, 21 fishes, 20 insects and 22 mollusks) and 138 vascular plants. These species occur in a wide variety of habitats and occupy a tremendous array of ecological niches. Some of these rare species are associated with Karner blue butterflies or their habitat (see Part 5 of Chapter IV, pages 255-256). Kirk (1996) and Borth (1997) examined some of the potential impacts to rare species associated with the Karner blue butterfly and its habitat in Wisconsin (see Appendix B). Under the No Action alternative, the DNR would not propose authorizing the take of 19 state listed species on partner lands in the Karner blue butterfly's high potential range (see pages 318-321). The potential impacts to state-listed endangered and threatened species are similar to the potential impacts from the Proposed Action alternative (see pages 318-321).

3. Effects on the Socio-Economic Environment

Human Population and Housing

The No Action alternative would not affect the rate or amount of population growth or housing construction. There would be no significant impact on the age structure or education levels of the human population living in the area of the affected environment.

The No Action alternative would not remove the ESA constraint posed by the presence of the Karner blue butterfly on approved and planned development during the 10-year permit period. Construction activity and economic development would continue in the permit area, however sites with Karner blue butterflies on private lands would be subject to coverage only through preparation of individual HCPs for each project being considered.

Growth in the area of the affected environment would be expected to follow recent trends (see Chapter IV, pages 264-273). However, the presence or absence of the Karner blue butterfly could affect the location of some individual developments. Sites with Karner blue butterflies might be avoided.

Socio-Economic Patterns

Implementation of the No Action alternative would not significantly affect household or per capita income within the area of the affected environment. Nor would it likely impact employment opportunities in the area.

The estimated annual costs of nearly $600,000 for implementing the HCP if an ITP were issued would not exist. However, expenses for development of individual HCPs would be borne by the partner entities as a part of their normal operating expenses. These costs would likely exceed the estimated annual commitments identified in the Proposed Action alternative. Similarly, expenses associated with HCPs that would need to be prepared by landowners other than partners would need to be assumed as a part of normal operating expenses. The USFWS would likely see increased costs associated with implementing the ESA due to the need to process multiple HCPs and ITP applications.

Land Use

The No Action alternative could result in a significant impact on land use on non-federal lands occupied by the Karner blue butterfly. In general, landowners may prefer to wait for the Karner blue butterfly to disappear through expected local extinction processes (i.e. natural succession), rather than pursue obtaining an individual ITP, in order to take advantage of economic opportunities on their lands. In some cases, economic opportunities may be completely eliminated.

The No Action alternative will likely not affect large-scale land conversion patterns or rates. However, in some instances, property with occupied habitat may be less desirable than property without Karner blue butterflies (i.e. occupancy may be an economic disincentive depending on the proposed future uses of the property). In such instances, the No Action alternative may affect local land use patterns.

Property Values

It is unclear what effect the presence of a listed species has on property values. Documented presence of a listed species could lower property values by precluding some uses of the property. Under the No Action alternative, uses on private property throughout the state would be limited by the ESA take provisions. Individual landowners and users would need to pursue their own HCPs and ITPs to maintain some uses, and the corresponding values, of their properties.

Transportation

The No Action alterative could have significant adverse impacts on transportation management in Wisconsin. In the absence of a statewide ITP, individual improvement and maintenance projects would require project-specific HCPs and ITPs or formal section 7 consultations with the USFWS. These individual permitting processes would likely add substantial costs to the state transportation program. Under this alternative, the DOT would be expected to proceed with planned projects, potentially with costly delays.

Cultural and Historical Resources

The distribution of cultural and historic resources is entirely independent of the distribution of the Karner blue butterfly in Wisconsin. Implementation of the No Action alternative would likely have no direct effects on cultural resources. Those cultural and historical resources in the area of the affected environment would continue to be protected and managed under applicable state and federal historic preservation policies and laws.

Table 5.4. Comparison of Effects of No Action and Proposed Action Alternatives

	No Action Alternative	Proposed Action Alternative
Physical Environment Geology and Soils Topography and Drainage Water Quality Climate and Weather Air Quality	no significant effects	no significant effects
Biological Environment		
Plant Communities	no significant effects; potential increase in old forests; no emphasis on barrens, savanna and prairie management	increase in early successional and young forest communities; some emphasis on barrens, savannas and prairies
Karner Blue Butterfly Populations	habitat lost to succession; populations potentially lost due to habitat losses; limited new habitat created	habitat maintained ("no net loss"); new habitat created; butterfly populations supported by habitat
Other Endangered/Threatened Species	no significant effects; no state incidental take authorization for state listed species	no significant long-term effects; state incidental take authorization for small number of state listed species
Socio-Economic Environment Human Population and Housing Socio-Economic Patterns Land Use Property Values Transportation Cultural and Historical Resources	no significant effects	no significant effects